THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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Annual Meeting of the American Electroplaters' Society

The Sixteenth Annual Convention of the American Electroplaters' Society in Toronto, Canada, June 25-28, a Great Success

By WALTER S. BARROWS
Secretary of the Convention Committee

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

The corridors of the King Edward Hotel, Toronto, Canada, were echoing happy salutations, snappy handshakes, jolly laughter and sincere expresisons of cordial welcome early on Monday morning, June 25th. The mezzanine floor, with its spacious areas, provided an ideal location for the several indoor features of the meeting. Entering this area, the delegates and visitors approached the registration desk and received their badges, books of tickets, programs, etc. Passing on, they entered the exhibition room where there were eight splendid displays, made by the firms named in the next column, and where real business talks became the stepping stones to orders.

EQUIPMENT AND SUPPLY EXHIBITS

The Bristol Company, Waterbury, Conn. Temperature Controllers for Chrome Plating Electrical Recording Instruments.

Frederic B. Stevens Company, Inc., Detroit, Mich. Conveyors.

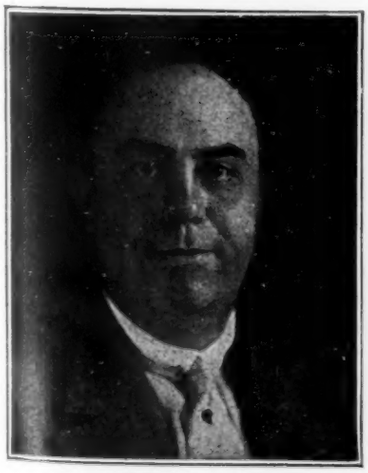
National Steel Products Company, Dayton, Ohio. Plating Barrel.

Canadian Hanson and Van Winkle Company, Toronto, Canada. Equipment Supplies.

International Chemical Company, Philadelphia, Pa. Metal Cleaners.

Oakite Products, Inc., New York, N. Y. Metal Cleaners.

Electroplaters' Officers for 1928-1929



F. J. HANLON
Editor, The Monthly Review

HORACE SMITH
President

GEORGE GEHLING
Secretary-Treasurer

Apothecaries Hall Company, Waterbury, Conn. Anodes and Metal Cleaners.

J. B. Ford Company, Wyandotte, Mich. Metal Cleaners.

Indiana Buff Company, South Bend, Ind. Buffs.

United Chromium Inc. Chromium Plating Process.

Divine Brothers Company, Utica, N. Y. Polishing Wheels.

Metal Industry Publishing Company, New York, N. Y.

Brass World Publishing Company, New York, N. Y.

Immediately across the corridor from the exhibit was the entrance to the Pompeian Room, where all business and educational sessions were held. Comfort, freedom from street noises, and ample space were agreeable features of this assembly room.

BUSINESS MEETINGS AND TECHNICAL SESSIONS

At a few minutes past ten o'clock, John Acheson, chairman of the Toronto Convention Committee, vigorously wielded the gavel and brought two hundred and seventy-five eager men and women to attention. After brief mention of the various features included in the proposed program, and modest reference to the committee's efforts to provide for their guests, Mr. Acheson called on John Walker, President of Toronto Branch. John is a bashful fellow, but he was "Johnny on the spot" this time; and when he introduced Controller Joseph Gibbons, John made a hit. Controller Gibbons, representing the City of Toronto, welcomed the delegates and visitors in a most charming and cordial manner. Thoroughly familiar with the developments under way in Toronto at present time, he was able to furnish some striking figures respecting the advantages offered to residents and manufacturers. For instance, he said that a six room house in Toronto could be lighted and operated electrically with respect to cooking, washing, etc., for $1.50 per month, due to hydro-electric power distribution.

F. C. Mesle, Past Supreme President of the Society, made the response in his usual clean cut manner, with a few well chosen words conveying appreciation.

Chas. H. Proctor, Founder of the A.E.S., addressed the gathering, choosing for his subject "United We Stand, Divided We Fall."

Supreme President John H. Feeley then assumed the gavel and the convention was opened for business.

Five educational sessions, each including papers of exceptional merit, were held during the convention. The papers presented were as follows:

"American Methods of Cadmium Plating" by William Schneider, Brooklyn, N. Y., called forth a very interesting and instructive discussion.

"Summary of Research Work on Electric Deposition at the U. S. Bureau of Standards," by Dr. William Blum received the attention always given to reports rendered by Dr. Blum.

"Immersion or Dip Gilding on Brass Jewelry and Novelties, in a Red or 14 Karat Gold Shade," by Joseph Triska, of New York, was particularly valuable to the gold and silver platers.

"Evolution of Plating," by Walter J. Allen, Grand Rapids, Michigan, proved an eye opener to many.

"Unwritten Work in Electro-Plating Problems," by F. J. Liscomb, was illustrated by lantern slides, and was a paper presenting many facts of great value to men engaged in any form of electrodeposition of metals.

In his talk on **"Control in Nickel Baths,"** which was also illustrated, Dr. J. T. Burt-Gerrans, Associate Professor of Electro-Chemistry, University of Toronto, presented a distinctly valuable contribution to the literature of electroplating. His references to the application of the thermionic (radio tube) millivoltmeter to the control of acidity in nickel plating baths were so impressive that he was besieged by interested listeners until 12.30 A. M., following his talk Monday evening, June 25th.

Prof. W. H. Price, of the Faculty of Applied Science and Engineering, University of Toronto, described the mechanical and electrical characteristics of the source of many plating room troubles in his paper **"The Low Voltage Generator."** Prof. Price incorporated in his lecture replies to questions submitted to him by foremen platers who have experienced serious difficulty in the operation of this type of generator.

Mr. Van Straaten, of the International Chemical Company, Philadelphia, Pa., presented a paper on **"The Plater's Position in Purchasing."**

W. P. Barrows, of the U. S. Bureau of Standards,

PLATERS AND THEIR LADIES ASSEMBLED AT NIAGARA FALLS

Washington, D. C., presented a report on researches conducted at the Bureau with reference to **"Spotting Out of Sulphide Finishes."**

"Health Hazards in the Electro-Plating Shop," by Dr. J. G. Cunningham, Director, Department of Industrial Sanitation, Province of Ontario, was of particular interest to those who operate or supervise electroplating baths of the cyanide or chromium types. Dr. Cunningham handled his subject, and the discussion which followed, in a very thorough manner.

Leo Roon, M.Sc., Technical Director, Royalin Flexible Lacquer Company, Long Island City, N. Y., made many friends by reason of his presentation of **"New Thoughts and Their Application in the Lacquer Industry."**

T. A. Gardner, New York Branch, read an instructive paper on **"The Finishing of Metals in Odd Colors"** and his explanatory display of finishes was a splendid study in metal coloring.

David Ayers, Prescott, Ontario, told of the peculiar tricks, a rotating mechanical plating barrel is capable of playing. The discussion following this paper indicated keen interest in this method of plating commercial products in bulk.

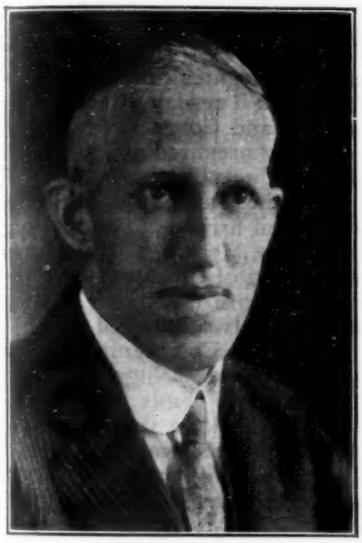
F. C. Mesle, Oneida Community Ltd., Oneida, N. Y., gave a splendid presentation of a paper on **"Silver Plating."**

K. E. Burgess, Superintendent, Zapon Lacquer Company, Stamford, Conn., described clearly and thoroughly the transition of vegetable and mineral substances into resin nitro cotton lacquer and lacquer enamel respectively.

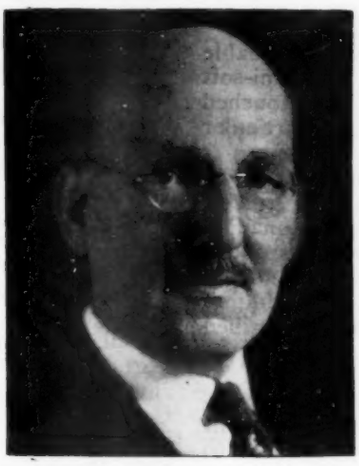
Oliver J. Sizelove, Newark, N. J., commanded perfect attention with his **"Chromium Experiments."**

C. Van Derau, Supervisor of Finishing Departments, Westinghouse Electric Products Company, Mansfield, Ohio, equalled his former contributions with his paper on **"Engineering of Chromium Plating."**

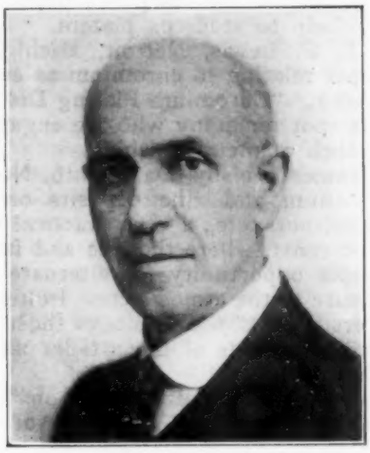
Winners of Prize Awards



DR. WILLIAM BLUM
Presented with a Gold Watch for Aid to the Plating Industry.



GEORGE B. HOGABOOM
Awarded Founder's Gold Medal and First Prize for Paper.



W. S. BARROWS
Awarded Honorable Mention for Paper.

THE GATHERING NUMBERED MORE THAN FOUR HUNDRED PERSONS

S. T. Lumbeck, Philadelphia, Pa., told of features connected with chromium which are not commonly admitted by the average enthusiast, in his paper **"Some Experiences with Chromium Plating."**

Charles H. Proctor gave an encouraging review of the chromium plating situation in his paper **"Chromium Plating—Its Present and Future."**

W. W. Patrick, Foxboro Company, Inc., New York City, told of the valuable assistance platers may receive from automatic control devices in his splendid paper on **"Temperature Control."**

Dr. A. K. Graham, Chemical Engineer, Roessler and Hasslacher Chemical Company, Matawan, New Jersey, in his paper **"What Happens at the Cathode and at the Anode,"** revealed to the plater several remarkable facts which have heretofore been more or less veiled. Dr. Graham's paper should be a wonderful help to studious platers.

B. F. Lewis, Detroit, Michigan, gave a valuable paper relating to chromium as employed on semi-soft metals. **"Chromium Plating Die Cast Metal"** touched the spot for many who are engaged in this particular branch of metal finishing.

James Welsby, Dartmouth, Nova Scotia, has given cadmium and zinc deposits on rough ship spikes, bolts, nuts, etc., a very practical test on the Canadian east coast, where the rise and fall of the tides afford ample opportunity for alternate immersions and exposure to the atmosphere. In his paper on **"Cadmium Versus Zinc"** the results of those tests were described and specimens of the articles used in the tests were displayed.

Unfortunately the paper on **"The Plater and Research"** by W. E. Hughes, of England, author of "Modern Electroplating," did not arrive in time to be included in the program.

PRIZE AWARDS

Prize awards for best papers contributed during the past fiscal year were as follows:

1st Prize—**Geo. B. Hogaboom,** Newark, New Jersey, for his paper, **"Nickel Anodes."**

2nd Prize—**C. F. Nixon,** Chicago, Illinois, for his paper, **"Nickel Anodes."**

3rd Prize—**Clarence Van Derau,** Mansfield, Ohio, for his paper, **"Chromium Plating."**

Honorable Mention—**W. S. Barrows,** Toronto, Canada, for his paper, **"Finishing Steel."**

Honorable Mention—**Jacob Hay,** Chicago, Illinois, for his paper, **"Chromium Plating."**

The Founder's Gold Medal for best contribution in form of either paper or exhibit during the last fiscal year was awarded to **Geo. B. Hogaboom,** Newark, N. J., for his paper, **"Nickel Anodes."**

Prize Awards for best exhibits made at this convention by individual platers were as follows:

1st Prize—**E. V. Allen,** Detroit, Michigan, for Chromium Plated Samples.

2nd Prize—**T. A. Gardner,** East Rutherford, New Jersey, for Metals Finished in Odd Colors.

3rd Prize—**William Grund,** Bloomington, Illinois, for Chromium Plated Samples.

TRIPS AND OTHER ENTERTAINMENTS

Four hundred and ten delegates and visitors went to Niagara Falls, Canada, on Tuesday afternoon, June 26th, via Steamer Cayuga, and Gorge Route Railway. A bountiful dinner, expertly prepared and served, was enjoyed at the Refectory, Queen Victoria Park. The official photograph, with the Falls as a background was taken immediately upon arrival. The ball game, an annual feature headed by Messrs. T. Trumbour of New York and R. J. Hazucha of Chicago, was a stampede of thrills. The final score was 17 to 5 in favor of the Western team. Fully two hundred visited the Canadian factory of the Oneida Community Company, and all expressed their delight at seeing such a model plating plant. The illuminated Falls were admired by all, and when the start back to the steamer was begun, the common exclamation was, "This is the end of a perfect day!" Dancing on board the S.S. Corona, used for the return trip, aided in obviating even the slightest discomfort from the cool evening air out on the lake.

ANNUAL BANQUET

The Annual Banquet, held in the Crystal Ballroom, King Edward Hotel, Wednesday evening, June 27, was truly a brilliant affair. Over 425 people were seated and a program of exceptional merit was thoroughly enjoyed. The Crescent Quartette rendered several selections. Madame Holland, Toronto's favorite contralto, delighted every one, and Bert Lloyd, comedian, amused them with his nonsense and songs. George Morrow, of Bridgeport, Conn., displayed his skill as a magician, his expert manipulation

EVERYBODY SPENT A JOYFUL DAY AT THE FALLS AND ON THE BOATS

of cards, handkerchiefs, paper squares, etc., creating much amusement, and it was evident that with the aid of a few doses of "Magic Fluid" George could easily be developed into a second "Herman the Great."

A TRIBUTE TO DR. BLUM

A specially pleasant feature of the evening was the presentation of a gold watch to Dr. Wm. Blum, Chemist, Bureau of Standards, Washington, D. C. The watch was a gift from the entire A. E. S. of the United States and Canada, indicating the deeply rooted love and admiration for the recipient, who has untiringly devoted himself to the innumerable problems of the electroplating industry, supply manufacturers, and students during many years. Dr. Blum was truly taken by surprise, and very feelingly responded to the presentation speech of George B. Hogaboom.

President John H. Feeley presented the prizes awarded for the best papers and platers exhibits, including the Founders Gold Medal.

A nine-piece orchestra under the supervision of Charles Musgrave provided music throughout the evening. Ballons, paper hats, etc., added to the hilarity and spectacular color of the scene. At the conclusion of the entertainment, the floor was cleared and dancing was enjoyed until 1 A. M., rounding out six hours of solid fun. The Egyptian Lacquer Company presented each person with a beautiful pack of playing cards and case.

ENTERTAINMENT FOR LADIES

The ladies attending the convention were provided with special entertainment during the afternoons and evenings while the men wre attending educational or business sessions. Monday afternoon, June 25, more than 80 ladies visited the department store of the T. Eaton Company and were escorted through the various factories operated by the company. At the conclusion of the tour, afternoon tea was served in the Georgian Room of the T. Eaton Company. Monday evening over one hundred ladies were entertained at cards in the Yellow Room, King Edward Hotel. Bridge and euchre made the formation of new acquaintances easy. Supper was served at ten o'clock.

Prize winners at Euchre were:

1st Prize, Mrs. C. J. Menzemer, with a score of 34.

2nd Prize, Mrs. A. Sheperd, with a score of 15.

Mrs. Erwin Sohn won the prize at bridge, with a score of 1400.

Wednesday afternoon a theatre party consisting of over one hundred ladies were entertained at Shea's Hippodrome. As no entertainment feature was scheduled for morning hours, the ladies were able to get their beauty sleep while hubby took a bun and coffee from the arm of a chair in one of the several convenient restaurants. The number of ladies registered was 110. Mrs. Walter S. Barrows, assisted by Mrs. James Vallier, Mrs. J. Acheson, Mrs. T. O'Keefe, Mrs. Joseph Ellis, Mrs. Henry Wallace, Mrs. John Walker, Mrs. John Lougheed, Mrs. Benjamin Deakin, Mrs. W. Sutherland and Mrs. E. Coles, of the ladies committee, were collectively and individually attentive to the ladies' comforts and pleasure.

PAST PRESIDENTS MEET

The Past Presidents' Association held their annual meeting and dinner in the King Edward Hotel, Monday evening, June 25, at 6 o'clock. John H. Feeley was inducted into the ranks, and felicitations were forwarded to Richard H. Sliter, Cleveland, Ohio, a member who has been seriously ill for several months past.

NEW OFFICERS OF THE A. E. S.

The closing session of the convention was held Thursday morning, June 28, with President J. H. Feeley in the chair.

Officers elected for the ensuing year were:

President—Horace H. Smith, Newark, New Jersey.

1st Vice President—Clarence VanDerau, Mansfield, Ohio.

2nd Vice President—W. J. Kennedy, Hartford-Connecticut Valley Branch, Hartford, Conn.

Secretary-Treasurer—George Gehling, Philadelphia, Pa.

Editor, Monthly Review—Frank J. Hanlon, Chicago, Ill.

The newly elected officers were then installed by Charles H. Proctor—Founder of the Society.

1929 CONVENTION TO BE HELD IN DETROIT

The selection of the convention city for 1929 was not without opposition. Three invitations were considered. New York Branch presented several reasons why the next convention should be held in their city. Detroit Branch members had been actively engaged during the convention in dispensing alluring inducements to the delegates and they entered the arena prepared to secure the annual. West Baden, Indiana, had a representative on the scene and the tussle began. But—New York with her immense proportions and many wonderful advantages and West Baden, with its health promoting, restful isolation, lost out in the grand final encounter. Detroit with its industrial progressiveness and several other attractions of particular interest to a great majority of platers, bagged the game. Therefore the Seventeenth Annual Convention, marking the twentieth anniversary of the Society, will be held in Detroit, Michigan, in 1929.

MISCELLANEOUS EVENTS OF INTEREST

A two-hour motor coach tour of Toronto, Thursday afternoon, June 28, completed the program. Prof. W. Lash Miller, chief of the Department of Chemistry, University of Toronto, and an honorary member of the American Electroplaters' Society, entertained members of the executive board of the Society, the Toronto Convention Executive Committee and a few others at dinner in Hart House, Thursday evening, June 28, when George Gehling made his initial bow on the stage of Hart House Theatre, in that pathetic little melodrama entitled, "The Bee and the Cow."

The total official registration at the convention was 428; the total estimated attendance exceeded 450. Delegates and visitors were unstinting in their praise and expressions of satisfaction and delight over the entertainment and educational program, the hospitality and consideration accorded them by Toronto Branch; and the Sixteenth Annual Convention was declared to be a truly successful event, unique in several respects, equalled by few and excelled by none.

Frank J. Hanlon was constantly being mistaken for a Baptist minister while he mixed with the clergy in the Lobby.

Wonder where Wilson White lost his connection with Elmer Gantry; the page boy failed to locate him.

Miss Marcia Rogan was the official reporter again this year.

Mrs. Bast, Bucyrus, Ohio, the only woman possessing active membership in the Society, was prominent throughout the convention.

Glassware was the favorite form of Souvenir chosen by the American visitors; colors varied.

An unusual number of the visitors ran short of funds this year. Wonder why? Too long a dry spell preceding the meeting might have had something to do with it.

The brand new gavel used during the convention was presented to the new president, Horace Smith, by Toronto Branch.

Edward Heil failed to reach Toronto but Ken did.

Bouquets should be easily available next year, "Where the Red, Red Noses Grow."

Ideal weather conditons prevailed during the Toronto meeting.

International Fellowship Club Recognizes Toronto

At the annual business meeting on Wednesday, June 27th, of the International Fellowship Club, held in the Yellow Room of the King Edward Hotel, the following officers were elected:

International Chairman, **Frank J. Clark,** Springfield, Mass., electroplating engineer of the Hanson-VanWinkle-Munning Company.

W. W. WELLS, JR.
International Vice-Chairman

FRANK J. CLARK
International Chairman

BENJAMIN POPPER
International Secretary

International Vice-Chairman, **William W. Wells, Jr.,** of W. W. Wells, 370 Victoria Street, Toronto.

International Secretary, **Benjamin Popper,** The Egyptian Lacquer Manufacturing Company, New York City.

The Americans assembled at this meeting were greatly pleased to have the opportunity to express their good fellowship toward Canada by electing the Toronto man to this office of Vice-Chairman. Mr. Wells responded on behalf of the Dominion. Another Canadian addressed the annual meeting, E. D. Ranck, General Manager of the Coleman Lamp Company, Ltd., Toronto. His remarks breathed good fellowship and friendship in a true Rotary fashion.

At the colse of the meeting the mantle of office was conferred on the respective officers by the creator of the movement—Wilfred S. McKeon, "Liquid Sulphur Mac," Greensburg, Pa.

The meeting was adjourned. The next meeting of the International Fellowship Club will be held at Chicago on January 4th, 1929.

Special Train for Chicago Members

The Chicago Delegation left Chicago, Ill., June 24th, 1928, at 9:05 A. M., in the Grand Trunk R.R., cars, Fazenda and Alamo; a wild and woolly crowd in one car led by the rodeo rider from Milwaukee, Pat Sheehan. The other contained the rest of the stars like Servis, Meyers and Liscomb. In all there were 40 people. They arrived at Toronto 10:45 P. M. and after the regular convention confusion by the hotel people we finally docked in our rooms one hour later.

SIDELIGHTS

At Valparaiso, Ind., we picked up the Mayor of a portion of the Village, J. Degrazzio who immediately went to musical part of program on his accordion by folding up. Messrs. Wittig and Meyers sang that good old ballad "Put On Your Slippers and Fill Up Your Pipe, You're Not Going Bye-Bye Tonight."

Messrs. Hunter, Hazucha, Greenblatt, Sward and Geisman assisted by Pat Sheehan and E. Lamoureaux tried the faith of the Goddess of fortune with the cards. Mr. Sward met with most success.

Messrs. Spencer, Cherry, Lyons, Huenerfauth, Willmore, Kocour and their several ladies, seemed to enjoy their renewed acquaintance en route.

The usual amusements were indulged in, cards and Bunco the latter, vocal and by the chiropractic method until Durand, Mich., was reached. We had the pleasure of meeting Mr. R. Servis, wife and baby, the youngest member of Servis Corporation, who caused one past president to be called Grandpop.

Impressions of the Annual Convention

By CHARLES H. PROCTOR
Plating-Chemical Editor

The annual convention held at Toronto is just a memory now, but what a splendid memory to carry in Memory's Garden until the next annual convention in Detroit in 1929. There was a great attendance. Every one you met seemed to have that enduring smile that lingers. Was it because they found more Liberty in Canada than in the United States?

The papers presented at the convention were of a high class and covered subjects interesting to the practical plater as well as the electrochemist. Each year it seems that the papers presented are better prepared. The entertainments for both gentlemen and ladies were splendid and well carried out. The weather during the entire convention was beautiful and exhilarating.

The steamer trip across Lake Ontario and up the Niagara River to Lewiston, New York, on the splendid steamer Cayuga of the Canadian Steamship Co. will always be remembered; then through the Niagara Gorge, on to Niagara Falls, New York and Niagara Falls, Canada; then in the evening the Niagara Falls, illuminated. What a splendid sight! Then we went back again to Toronto. It is all a memory now, but it will live on and on.

Much credit is due to the Executive Committee, John Acheson, W. S. Barrows, John Walker and Thomas O'Keefe. The splendid ovation they received at the closing of the convention assures them that they and all members of the several committees, both ladies and gentlemen, share in the great tribute that every visitor to the convention is only too glad to convey to them.

And now to the future of the society. Its doors must be opened wider and still wider so that all can enter its portals who are interested in its future welfare. The Society, to grow, must have a continual healthy addition to its membership list. We must all look to the future. As the years come and go the men who stood at the helm of the ship through its early history, through storm and sunshine, will pass on towards the Great Unknown. They will not return so at the next Annual Convention at Detroit, Mich., have all the constitutional amendments so arranged that they will be broad in their scope for the good of the Society.

Admit electrochemists who have had chemical supervision of electroplating plants for three years, as active members. Admit assistant foreman platers as associate members who have held this position for at least three years and can be vouched for by the firm with whom they are employed.

The assistant foreman plater must eventually become the foreman plater and it is to him in the future that we must look to carry on the work of the Society if the active members of today desire the Society to continue on as a foreman platers Society.

Let us all look forward to the future. The past is nothing in the face of the stern today. And then if we have foresight the Society will grow and its leaders will reap the reward of a work well and faithfully accomplished.

MR. PROCTOR GOES ABROAD

Mr. and Mrs. Charles H. Proctor of Arlington, N. J., will leave on Saturday, July 14th, for a trip to Europe on the "Cunarder" Tuscania, leaving at midnight on July 13th. They anticipate visiting England, France, Germany and Holland. Mr. Proctor goes to Europe in search of health and a well earned rest. His last trip to Europe was in 1886.

He will, however, continue to look for information on the progress made in electroplating in the several countries he and Mrs. Proctor will visit.

Electroplating Precious Stones

Q.—We wish to electroplate a large number of semi-precious stones, such as sapphires, garnets and pieces of glass. Some of these are to be coated with copper, some with nickel. Can you supply us with complete information for treating these pieces before plating. We understand that this is being done by some concerns, but inspection of such products shows that there is sometimes a slight discoloration between the surface of the stone and the metal coating. We would like to get the nickel or copper as close to the surface of the stone as possible.

A.—The method used in preparing some precious stones for plating is as follows:

The stones are treated in an alcoholic solution of nitrate of silver. The nitrate of silver is first dissolved in as little boiling water as possible for solution, then it is mixed with denatured alcohol. The proportions will have to be decided upon by actual test. Start with 1 oz. silver nitrate, 4 ozs. water, 16 ozs. alcohol. These proportions may be increased or decreased as may be found desirable.

The stones should be immersed in the solution for a few minutes then removed and allowed to drain and dry.

A silver sulphide must then be formed upon the silver nitrate that adheres to the stones. This can be accomplished by placing them under a glass dome with some iron pyrites placed in a dish containing 1 part sulphuric acid to 10 parts water. Hydrogen sulphide is released and the silver is reduced to silver sulphide.

The stones can then be plated in a copper sulphate solution to obtain a more substantial metalized surface. (See PLATERS' WRINKLES) Afterwards they can be plated in any metal finish wanted. The silver sulphide will have to be removed from the exposed front of the stones or the metal plating will deposit all over.

It is possible that you will first have to copper plate the silver sulphide surface upon the stones with a very dilute solution of copper sulphide:

Water	1 gallon
Copper sulphide	2 ozs.
Rochelle salts	1½ ozs.
Aqua ammonia	⅛ oz.

Voltage 2; anodes, sheet copper.

After copper plating for a short time to obtain a uniform deposit, copper plate quite heavily in an acid copper solution. Then follow up with the nickel deposit as desired. The first deposit of copper is the most important. We trust these suggestions will solve your problem.

—CHARLES H. PROCTOR

Annealing of Metals in the Electric Furnace

A Paper Presented at the Fifty-third General Meeting of the American Electrochemical Society, Held in Bridgeport, Conn., April 26, 27 and 28, 1928.

By ROBERT M. KEENEY

Industrial Heating Engineer, The Connecticut Light and Power Company, Waterbury, Conn.

Selection of the source of heat for the annealing of non-ferrous metals and alloys is an economic problem. The final choice should be decided by the economies of the situation, as shown by the over-all cost of the finished product with the different forms of heat. Items which influence over-all costs in manufacture of copper, brass or nickel-silver products are: (1) Pickling; (2) Fuel; (3) Power; (4) Labor; (5) Maintenance; (6) Haulage and handling, dependent on location of annealing furnace with reference to line of production; (7) Dollar value of quality and rejections; (8) Die maintenance; (9) Capital charges; (10) Working conditions.

Except where an improvement in working conditions may be of the greatest importance, the decision should be made on no other basis than total costs, but if the total costs of the two forms of heat seem to be the same, then the form of heat most convenient to the specific application should be used. Simple comparison of the B.t.u. cost of electricity, gas, oil or coal gives an erroneous impression, because no allowance is then made for higher furnace efficiency, lower labor cost, elimination of spoilage, less pickling, or other items which influence over-all cost, the only cost figure that results in profit or loss. Gas may cost more per B.t.u. than oil or coal, but because of the possibility of its more efficient application may be by far the cheapest fuel. Electricity costs more per B.t.u. than gas, oil or coal, but because of the possibility of its more efficient application, better temperature control, and reduction of pickling and labor costs, may prove to be the cheapest form of heat for the manufacturer to use.

Many industrial fuel engineers tend to over-emphasize B.t.u. cost when making cost comparisons of various fuels, and when considering their own particular pet fuel in comparison with electricity, they seldom get any further. The inexperienced industrial electric heating engineer over-emphasizes the intangible advantages of electric heat. Neither argument can stand up in the face of the over-all economic situation. Lower costs per B.t.u. mean nothing if less efficient utilization, higher labor cost, greater maintenance cost and more pickling result in less profitable operation, just as the admitted intangible advantages of electric heat are worthless, if they do not produce a saving in over-all cost and increased profit. If the intangible advantages are real advantages they will in some way affect costs. The heat chosen must result in the lowest over-all cost, or it will be displaced eventually by some more economical form of heat.

The industrial plants of Connecticut have been very progressive in the application of electric heating to industrial uses, largely because electric heating in these cases has shown a saving in over-all cost. The industries of Connecticut have approximately 35,000 kilowatts of industrial electric heating equipment, consuming over 100,000,000 kilowatt hours per year. Of this furnace capacity, 22,000 kilowatts is installed for the melting and annealing of non-ferrous metals. Conservatively, electric brass melting alone saves the mills of the State over $1,000,000 per year.

For annealing non-ferrous metals Connecticut has 27 electric furnaces and annealing machines, of an installed capacity of 5,865 kilowatts, distributed among 15 industrial plants. These furnaces are used for the annealing of brass condenser tubes, seamless brass tubing, brass shells, brass eyelets, aluminum tubing, nickel-silver stampings, and for the bright annealing of copper tubing. Little progress has been made in the application of electric heating to the breaking down operations of the brass rolling mill, but it is proceeding rapidly on the lighter products, which require more finishing, such as tubing, stamping blanks and shells. The installations are shown in Table I.

TABLE I

Non-Ferrous Metal Annealing Furnaces in Connecticut.

Plant No.	Application	Number of furnaces	Kilowatts each	Total kilowatts
1.	Brass and aluminum tubing	3	350	1,050
	Copper tubing	4	120	480
2.	Copper tubing	1	390	390
3.	Brass shells	2	150	300
4.	Brass shells	2	150	300
5.	Condenser tubing*	1	500	500
6.	Nickel-silver stampings	1	60	60
7.	Nickel silver stampings	2	80	160
8.	Nickel-silver stampings	1	100	100
9.	Nickel-silver stampings	2	100	200
10.	Nickel-silver stampings	1	45	45
11.	Brass shells	1	300	300
12.	Brass eyelets	1	80	80
13.	Miscellaneous, shells and sheet	1	150	150
	Miscellaneous, shells and sheet	1	250	250
	Condenser tubing*	1	500	500
14.	Condenser tubing*	1	500	500
15.	Condenser tubing*	1	500	500
	Total	27		5,865

*Annealing machines.

BRASS

Electric annealing of brass tubing has developed along two distinct lines: (1) individual annealing of a tube by passing electric current through it, and (2) annealing of a mass of tubing in a muffle furnace.

Annealing of tubing by passing current through it is the best method of giving the finishing anneal to condenser tubing. It produces a more uniform product than any form of Muffle annealing, either electric or combustion. It has the following advantages: (1) Lower over-all cost of finished tube; (2) Speed of heating, because heat is generated in every portion of tube simultaneously, and no soaking is necessary; (3) Practically no oxidation; (4) Fits in line of production; (5) No pyrometer required; (6) Tube not exposed to furnace gases; (7) Consistent production of uniform work to meet very close specification; (8) Elimination of rejections; (9) Elimination of all pickling.

The tube annealing machine is very simple, consisting of a table for holding the tubing, a transformer, jaws op-

erated by solenoids for gripping both ends of the tube, and a dial for indicating expansion of the tube for various temperatures. The operation of the machine requires little skill, as the tube is gripped at both ends, current applied and cut off, and the tube released by movements of an operating handle.

Condenser tubes 1 in. (25.4 mm.) diameter by 0.65 in. (1.65 mm.) up to 22 ft. (6.71 m.) long are heated to 500° C. (932° F.) at the rate of four per minute with a production of 30 lb. per kilowatt hours per ton. With the smaller condenser tubes the speed is much higher. Tubes 0.625 in. (15.8 mm.) by 0.059 in. (1.5 mm.) by 21.5 ft. (6.56 m.) are annealed at the rate of 10 tubes per minute. The loading time of the machine is two seconds. Machines[1] have annealed tubing at the rate of 5,000 lb. (227 kg.) per hour.

These machines show a material saving in over-all costs, with an investment comparable to that of a furnace, because of the improved product, which eliminates rejections after the finish anneal low labor cost; and elimination of pickling. Their use has become common in the large mills making condenser tubing.

Electric annealing of seamless brass tubing in the muffle furnace has replaced wood muffle annealing. One manufacturer has replaced all of the wood fired muffles used for annealing brass and aluminum tubing with electric furnaces, and has replaced gas heated water sealed furnaces used for bright annealing of copper tubing with electric water sealed furnaces.

This plant[2] installed a 350 kilowatt furnace in 1924 operating on 230 volt, 3 phase, 60 cycle circuit, and having inside muffle dimensions of length 16 ft. (4.88 m.); width, 4 ft. (1.22 m.) and height to spring line of arch 18 in. (45.7 cm.). This furnace has been in almost continuous operation 10 hours per day for almost four years annealing at a muffle temperature of 1,200° F. (648° C.) without a coil burn-out or any furnace maintenance expense, giving an excellent example of the life of electric furnace coils, and of the low cost of maintenance of properly built electric furnaces. The first furnace has been followed by two other 350 kilowatt furnaces, with the elimination of all wood fired annealing furnaces.

The first furnace as installed in 1924, with simple "on and off" control, annealed yellow brass tubing in small sizes and thin gauges with a power consumption of 110 kilowatt hours per ton (2,000 lb.; 907.2 kg.) of tubing or 18.2 lb. (8.05 kg.) per kilowatt hour. This furnace with coils in the bottom, two sides, and top of the muffle, has two control groups, each covering one-half the length of the muffle. Whereas the production of this furnace was 18.2 lb. (8.05 kg.) per kilowatt hour during the first year of operation, it was shortly increased to 20 lb. (9.07 kg.) or a consumption of 100 kilowatt hours per ton (2,000 lb.; 907.2 kg.) by the development of a selective load control.

The increased efficiency resulting from this selective control appears to be due to the more rapid absorption of heat by the mass of tubing in the furnace, because convection currents of the furnace atmosphere are established. This is contrary to the general opinion that all heating in an electric resistance furnace is by radiant heat. It leads to the thought that possibly mechanical circulation of a furnace atmosphere may prove beneficial in increasing speed of annealing.

The two 350 kilowatt furnaces installed later are of the same dimensions, but have four control groups instead of two. There are two groups in the furnace bottom, and two in the sides and arch. These additional control groups were installed because it was found that the bottom coils should be on most of the time, and should be arranged for independent operation. In these two furnaces, equipped with load control, the production is 24 lb. (10.88 kg.) per kilowatt hour, or a consumption of 83 kilowatt hours per ton (2,000 lb.; 907.2 kg.).

This installation was made entirely on an economic basis, a large saving in pickling cost and labor having been demonstrated by experiments before the first furnace was purchased. The pickling time has been reduced to about one-quarter of that previously required, because there is much less oxidation of the tubing, which has resulted in cutting labor cost in two and in a material reduction in acid consumption. This electric furnace installation anneals brass tubing at a cost for annealing and pickling of $2.00 to $2.50 per ton less than the former wood fired muffles, and results in a yearly return of about 50 per cent on the furnace investment.

COPPER

The electric water sealed furnace has proven very satisfactory for the bright annealing of copper tubing. One manufacturer selling tubing to the refrigerator and automobile industries brought about a material saving in costs and an improved product, by replacing two gas heated water sealed furnaces with two 120 kilowatt electric furnames operating on 230 volt, 3 phase, 60 cycle circuit. These furnaces are of the usual water sealed type with a cylindrical, vertical furnace chamber suspended over a pit of water, and having electrically operated platforms for carrying the work into and out of the furnace through the water seal. The inside dimensions of the furnace chamber are diameter 37 in. (91 cm.) and height 5 ft. (1.5 m.). A nickel-chromium retort similar to the retort of the combustion water sealed furnace sits in the furnace chamber, and the work is raised into it. Nothing has been expended in maintenance expense of these furnaces during their three years of operation at 1,300° F. (714° C.). Two additional 120 kilowatt furnaces of the same type have recently been put in operation.

These electric water sealed furnaces have an operating cost of $5.00 per ton lower than the former gas heated furnace, and return at least 50 per cent annually on the investment. The cost of electricity per ton annealed is several dollars per ton less than the former gas cost, and there is a large saving in maintenance, which in the gas furnace in some months was as high as the gas cost. This maintenance saving of the electric water sealed furnace places it on a closely competitive basis with the oil fired water sealed furnace.

Another manufacturer has a 390 kilowatt rectangular water sealed furnace used for annealing copper tubing. This furnace differs from the cylindrical furnace in that the tubing is not coiled but is laid horizontally in straight lengths on the charge platform. Also there is no retort in the furnace, steam being kept from damaging the insulation by having a sheet steel shell between the refractory lining and the insulating brick. The furnace chamber is 16 ft. 3 in. (4.95 m.) long and 5 ft. 3 in. (1.6 m.) wide. It is mounted on wheels over a pit of water. On charging the loaded platform drops onto the pit, after which the furnace is moved over the platform, and the platform is elevated into the heating chamber. There are two control circuits operating on 460 volt, 3 phase, 60 cycle circuit.

NICKEL-SILVER

For the annealing of nickel-silver stampings, electric heating is proving to be the most economical heat. Seven furnaces are operating in Connecticut, replacing both oil and gas furnaces. Two types of furnaces are in use, the

[1] C. C. Waite, Snead Electric Heating and Annealing Process, Metal Industry, 23, 44 (1925).

[2] R. M. Keeney, Annealing of Brass Tubing in the Electric Furnace, Trans. Am. Electrochem. Soc., 46, 457 (1924).

vertical water sealed furnace, which provides complete sealing of the heating chamber, and a double end, horizontal box type furnace, which has a water seal only on the discharge end. In comparison with the oil fired muffles formerly used, the electric vertical water sealed furnace results in an annealing and pickling cost $1.50 per ton lower, and produces a uniformly annealed product free from oxidation, which means a saving in the subsequent cost of manufacture.

The box type furnace with a water seal on the discharge end only is the latest development in annealing of nickel-silver stampings. Three such furnaces are in operation. The first furnace installed has inside dimensions of width, 25 in. (63.5 cm.), length 8 ft. (2.44 m.) and height 19 in. (48.2 cm) and has a power input of 60 kilowatts, operating on 230 volt, 3 phase, 60 cycle circuit, at 1,300° F. (714° C.). Possibly this type of furnace does not produce quite as clean work at all times as the vertical water sealed furnace, because of the lack of a seal on the inlet end of the furnace, but for practical purposes it is as clean. Pickling must be done in either case to remove water stain.

In comparison with the oil box type furnace, the electric box type furnace reduces pickling labor 50 per cent, and results in much lower acid consumption. It has been possible to reduce vat capacity to one-quarter that formerly required. A conservative estimate indicates that the annealing and pickling cost is $3.50 per ton, (2,000 lb.; 907.2 kg.) less than with the oil fired box furnace, a return of 50 per cent on the investment.

Among all the applications of electric annealing of non-ferrous metals, made by Connecticut manufacturers during the past five years, there has been only one failure. In this case a furnace too large for the daily quantity of work to be performed was installed, with the result that the furnace was never loaded, and the power consumption per ton was double what it should have been, so that the operating cost was prohibitive. The furnace was scrapped and the use of oil resumed.

Any factory superintendent who has used electricity for heat treatment, dislikes returning to combustion heating, and in this case after a period of operation with oil, the electric furnace was again investigated with the result that a furnace of different design and of less than one-half the power input of the first furnace is now turning out production at such a saving over oil furnace operation that a return of 50 per cent on the investment is made. A furnace too large for the job invariably results in high operating cost and a dissatisfied user.

ROLLING MILL

Table I shows clearly that electric annealing furnaces are now accepted as the most economical furnaces for production annealing in the finishing stages of manufacture of non-ferrous metal products. But the question naturally arises, why have no Connecticut manufacturers installed electric furnaces for rolling and drawing of brass, copper and nickel-silver into sheets, heavy tubing and wire? Possibly no furnaces have been installed for rolling mill operation, because no manufacturer has taken the trouble to investigate the effect on manufacturing operation and over-all cost of an annealing furnace which can be placed directly in the line of production, thus reducing labor and haulage; a furnace which operates throughout the year with daily duplication of furnace conditions and uniformity of product, and which on a non-ferrous metal may cut the pickling cost in half.

The motor industry has investigated over-all costs in this way, and today two of the largest companies are over 95 per cent electrified in their heat treating operations. One motor manufacturer within the past year has installed more than 50 electric furnaces, with additional furnaces going in weekly, for forging, a class of work formerly considered to be only an oil application.

Possibly no such investigation has been made in non-ferrous rolling mills because, on first thought, electricity is thought of as too expensive, and no further analysis of over-all costs is made. For the rolling mill, naturally a large user of power, electric heating is not far out of line on a heat basis only. The older brass annealing furnaces use eight gallons (30.28 L.) of oil per ton (2,000 lb.; 907.2 kg..). It is estimated that the latest design of recuperative oil fired brass annealing furnace will burn four gallons (15.14 L.) of oil per ton (2,000 lb.; 907.2 kg.).

Manufacturers, who have analyzed the cost of handling and burning oil, admit a burner cost of eight cents per gallon (3.785 L.). In the case of many of the present furnaces the heat cost for annealing with oil is $0.48 to $0.64 per ton (2,000 lb.; 907.2 kg.). The counterflow recuperative electric furnace is now annealing light brass products on a tonnage basis with a power consumption of 50 to 65 kilowatt hours per ton (2,000 lb.; 907.2 kg.). On heavy work the power consumption need not exceed 50 kilowatt hours per ton.

With increment power at 1 cent per kilowatt hour, including demand charge, a rate which any furnace having 500 hours use of demand per month will earn in a large rolling mill, the cost for electric annealing is $0.50 per ton (2,000 lb.; 907.2 kg.). That is, for heat alone electricity is $0.18 per ton more expensive than the estimated cost with the most modern oil fired furnace, and $0.14 per ton cheaper than the cost with the older type of oil furnace. Also the investment cost for the recuperative electric furnace is less than that of the new recuperative type of oil furnace, and from all results obtained to date the maintenance cost is much lower for the electric.

On the most unfavorable basis of comparison, electric heating is only $0.18 per ton (2,000 lb.; 907.2 kg.) more expensive per each anneal for heat only and if there are six anneals before shipment $1.08 per ton of product, or about one-twentieth of a cent per pound (0.45 kg.). It is doubtful whether the average mill even with the most modern furnace can keep oil consumption much under 6 gallons (22.71 L.) in which case the heat cost of oil and electricity will be equal.

Considering either the most unfavorable basis of comparison for electricity or the probable basis of comparison, to the manufacturer familiar with possible savings in operations subsequent to the rolling mill, electric annealing would seem to be the cheapest form of heat in the only cost figure that pays dividends, overall costs.

Smooth Brass Castings

Q.—Enclosed please find two small, brass castings, one of which is quite rough and the other very much smoother. The smoother casting has been tumbled but apart from that it can be readily seen that when it left the sand it was not nearly as rough as the larger piece. Our castings are coming out very rough, like the larger sample, and we trust that you will be able to advise us what steps to take to get castings as smooth as the smaller piece.

A.—We have your samples and upon examination we find that the one very smooth casting is simple to mold while the other has a rather hard lift and has to be rammed soft to lift the cores. We feel that if you will roll your sand through a roll such as a Simpson mill and use No. 1 Albany sand you will secure a finer finish even though the ramming of the mold must be softer to secure the proper lift. Your metal has no bearing on this problem, but if aluminum is added to the metal it will prevent the burning of the sand.—W. J. Reardon.

Standards for Brass Wire

Resubmission of Proposed United States Government Master Specification for Three Grades of Wire.*

Brass wire shall be furnished in the following three grades, as specified:

A—Annealed, Soft.
B—As Drawn.
C—Spring Temper.

Brass wire shall be made from virgin metals, except scrap as may accumulate in the manufacturer's plant from materials of the same composition, and of the manufacturer's own make, may be used.

GENERAL REQUIREMENTS

1. The wire shall be uniform in composition and quality, free from all injurious internal and surface defects, cracks, seams, laps, slivers, kinks and scale. It shall be new, bright, smooth, and of uniform color and size.

2. Wire shall not vary from the specified diameter by more than the amounts shown in Table 1:

TABLE 1

Diameter of Wire (Inch)	Permissible Variation (Inch)
0.025 to 0.0375	Plus or minus 0.0004
0.0376 to 0.080	" " " 0.0005
0.081 to 0.1875	" " " 0.0010
0.188 to 0.250	" " " 0.0015

DETAIL REQUIREMENTS

1. The chemical composition of the wire shall be as covered by Table 2:

TABLE 2

Grades	Copper (per cent)	Lead, Maximum (per cent)	Iron, Maximum (per cent)	Zinc (per cent)
A and B	64 to 70 excl.	0.150	0.06	Remainder
C	70 to 74	0.075	0.06	Remainder

2. The wire shall meet the physical requirements of Table 3:

TABLE 3

	Tensile strength per square inch (in pounds)			
Grade	Under 0.080 inch diam.	0.080 inch to 0.150 inch diam.	Over 0.150 inch diam.	Ductility tests
A	Minimum 40,000	Minimum 38,000	Minimum 36,000	See
	Maximum 56,000	Maximum 54,000	Maximum 52,000	section
B	Minimum 65,000	Minimum 65,000	Minimum 60,000	VI. (3)
	Maximum 70,000	Maximum 70,000	Maximum 68,000	below
C	Minimum 120,000	Minimum 118,000	Minimum 116,000	

METHOD OF INSPECTION AND TESTS

1. One tension and one ductility test specimen shall be selected from each 500 pounds or fraction thereof.

2. One chemical analysis sample shall be taken to represent each 1,000 pounds or fraction thereof.

3. Grades A and B wire shall be capable of being wrapped eight times around a rod having a diameter not more than five times the diameter of the wire. Upon release of the free end, the spring shall not be greater than that given in the following table:

Diameter (inch)	Degree unwind of free end Grade A	Grade B
Under 0.080	30°	35°
Wire over 0.080	25°	40°

Grade C wire shall withstand being bent cold 360° around a wire of the same diameter without showing cracks or fracture.

PACKING AND MARKING OF SHIPMENTS

1. Unless otherwise specified, brass wire shall be furnished in one-pound spools, five-pound coils, or ten-pound coils, as called for.

2. Coils and spools shall be marked with the name, grade, size, and weight of the wire, and any other data desired by the purchaser.

1. The brass wire covered by this specification is intended for use only where commercial brass wire is applicable.

2. Grade A brass wire is used for beading, seizing, etc.

3. Grade B brass wire is used for hinge-pins, rivets, lamp guards, etc.

4. Grade C brass wire is used for springs, locking rings, etc.

5. Orders should state:

(*a*) Grade of wire desired.
(*b*) Diameter of wire in inches.
(*c*) Net weight of coil or spool desired.

NOTE: Resubmitted specifications for Black or Galvanized (Zinced) fence wire have also been issued. They can be obtained from the Federal Specifications Board, Washington, D. C.

* For specifications originally proposed, see THE METAL INDUSTRY, February, 1928, page 73.

Casting Plates

Q—Can you give me any directions for casting plates 6 in. square and from 1/16 to ⅛ in. thick. The plates must be absolutely smooth, flat and free from scratches. The material to be used can be type metal, lead or tin. I made a plaster of paris mold which had a good smooth surface, dried it well in an oven and cast plates of tin, lead and type metal, each one casting full-size but very much blistered.

A—Why try to cast such a metal when you can buy rolled sheet metal in either tin or lead of such a thickness? If, however, you want to cast this material in a plaster mold make up a mixture as follows:

40% plaster of paris,
30% asbestos fibre,
30% brick dust.

Dry in an oven at about 500 degrees Fahrenheit for twelve hours. Take out and pour as soon as possible after taking from oven. We believe, however, that the rolled material will give you a much smoother surface and at half the cost.—W. J. REARDON.

Gold Leaf Produced Electrolytically

A New Method of Producing an Old Commodity

By R. T. LEIGHTON
London, England

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

The production of gold leaf has been going on for over 4,000 years, and it is a curious fact that the method of hammering out the leaf has changed but very little during this long period. The manufacture of gold leaf is perhaps the only industry which has been entirely undisturbed during the march of progress, which in practically every other case has led to the adoption of mechanical devices for improvement in the process of manufacture, and to the ultimate lowering of the cost of the article.

It has been said that only by the old method of beating can the precious metal be stretched to that fineness so essential for the common use of gold as an article of decoration. But now by an invention covered by U. S. A. Patents No. 1512696/1924 and No. 1512825/1924 it is shown that gold leaf of even a higher standard can be produced by electro-deposit.

FIG. 1—ANCIENT GOLD BEATER

For the benefit of the uninitiated it is interesting to explain that the old hammering process consists of laying squares of comparatively thin strips of gold between sheets of refined material (well known as gold beaters' skin) and beating until the leaf is stretched to its uttermost limit, which is about 4 to 4½" square.

The ancient Egyptians at first used parchment, but later copper foil for this purpose, and the only real change adopted by the modern manufacturer is in the use of the more convenient material already described.

Illustration No. 1 pictures an Egyptian gold beater 2500 B.C. This detail is from the relic of a tomb at Sakkarah (Perrot & Chipie). It shows the pack resting on a stone block and held down with the left hand, whilst with the right it is struck with a stone ball.

Illustration No. 2 (photo of a gold beating shop of the present day) shows that the method now employed differs only by the substitution of the hammer for the heavy stone used in the old ays.

The new method providing for the electrolytic production of gold leaf is very simple. The gold is deposited on silver already rolled out to the finest possible thinness. The silver is the cathode on reels many yards in length, and the gold is deposited while the silver ribbon is pressed against a drum having an elastic surface in which the edges of the band are more or less embedded, thus preventing the flow of liquid on the back of the silver ribbon. As the gilded band leaves the electrolyte it passes into a bath of water for cleaning, and leaving the water is suitably spooled and cut into any required size, or left in the full length of the reel (many yards) for the production of ribbon gold now so much in use.

FIG. 2.—MODERN GOLD BEATERS

Production by this new method will undoubtedly very materially lessen the cost of gold leaf, and lead to its greater use in the realms of commerce, as well as for artistic decoration in cases where its present cost is almost prohibitive. In this connection it may be usefully noted that by the new electrolytic process it is also possible to make a lower grade leaf because alloys which cannot be hammered, and for that reason are not available to the gold beater, can safely be utilized for the purpose.

Many users have been supplied with the new leaf, and speak in high terms of the quality as compared with the beaten leaf hitherto used by them.

To Study Proper Baking of Cores

On May 1, the American Gas Association, through its committee on industrial gas research, F. J. Rutledge, chairman, established a fellowship at the University of Michigan, Ann Arbor, to make an intensive study of the many factors entering into the proper baking of cores. This research will be conducted at the Department of Engineering Research, under the supervision of H. L. Campbell, Associate Professor of Shop Practice, who is eminently fitted for the work through wide experience in the foundry field. Professor A. E. White is director of the Department of Engineering Research.

Every factor affecting the application of heat in core baking will be investigated and fundamental facts established to determine the advantages of properly controlled atmospheres, temperatures and ventilation in ovens for baking cores.

The increase in the use of gas for core baking has focused the attention of foundrymen on the desirability of a more scientific control over oven conditions and created a demand for research to establish basic data, which the American Gas Association has undertaken by the establishment of this fellowship.

Sampling and Evaluating Secondary Metals

A Complete Description of the Precautions Necessary in Sampling Waste Material—Part 2*

By T. A. WRIGHT
Secretary, Lucius Pitkin, Inc., New York

A PAPER READ AT THE NEW YORK MEETING OF THE INSTITUTE OF METALS DIVISION, THE AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, FEBRUARY, 1928

SIZE OF THE SAMPLE

The weight of the final sample is dependent on (1) the melting equipment available and (2) the size and character of the pieces in the shipment. Ore can always be broken down and crushed; scrap rarely. The larger the particle size, the fewer the particles, and consequently the larger the sample required. The more varying the character of the pieces, the larger the sample required; 100 lb. might be none too much to melt of an irony composition, while 20 lb. might be plenty for dirty grindings or No. 2 wire.

For convenience, it has been the habit at some smelters to take even and definite weights for melting, such as 50 or 100 lb. (10,000 to 20,000 gm.) This is not good practice, for to get an even weight, something must be taken from or added to the final sample. Either a definite quarter or two quarters should be weighed "as is," whether selected by the shovel or by hand. There is no doubt that taking round figures, such as multiples of 10 or 100, minimizes clerical errors, in one way, especially in calculating the final assay, but the weights of the various portions after melting or screening are rarely even, so the clerical and mathematical advantages claimed are at least open to question.

MELTING EQUIPMENT AND PRACTICE

Copper, brass, scrap and copper-bearing material are usually melted in graphite crucibles, sizes from No. 100 to 150 being in general use. On account of the bulky nature of some of the scrap, it is best to be generous as to capacity. It is sometimes necessary to charge in several batches and possibly add more flux.

The furnaces may be either of the pit or tilting type, and are usually oil-fired. One man can handle two furnaces, but two men are required for melts much over 50 lb. This increases sampling costs, which are, of course, passed on to the shipper, and increased accuracy gained by melting a larger sample may be more than offset by the increased sampling charges.

All the samples should be delivered to the melter in containers plainly marked with the lot number. The charge can be placed in the crucible and the necessary flux added. Borax is generally used alone or with additions of charcoal, soda ash, and sometimes sand, depending on the material. Salt should not be used with samples in which the copper and tin are to be determined, and in melting all samples for lead, tin and antimony, care must be taken to avoid excessive heat in melting.

A crucible will give 12 to 14 melts, on the average. Clean copper-bearing material will give from 18 to 20 melts; very dirty and irony material from 5 to 10, and battery lead rarely over 7 or 8 melts. High-zinc and irony samples are the hardest on crucibles.

After the sample is properly melted the free iron may be skimmed off into a pan; tagged, cooled and weighed. The slag is then skimmed into a pan, or better still, poured with the metal into a mold, the slag broken loose and weighed. If very small in amount or of a light color, it can be disregarded altogether. This is usually the case in heavy and light copper, clean brass, etc. Slags from furnace products, dirty scrap, etc., should be weighed, crushed to 60-mesh and sieved.

Shot will often be found. Experience has shown that the copper assay of this shot will rarely vary more than 3 per cent from copper assay of the bar, so that it is generally cheaper and sufficiently accurate to weight the shot, deduct the weight from the slag and add the weight to the bar, thus saving an assay. The slag as ground is mixed, quartered and bagged. If it is necessary to remelt a bar because of hard irony shots, it is best to add more flux. The weight of the second slag should be added to that of the first, and the two should be mixed.

After skimming, the melt is poured into a flat slab or bar, preferably not over 1 in. thick. Drillings should be taken from all portions, drilling through each time. The drillings should be mixed carefully before bagging, but it is rarely necessary to grind them.

Great care must be taken in tagging and marking, and the stamping of the bar is especially important, for it is the heart of the sample.

The after-melting, or A. M., weight should be taken and noted; in fact, all weights pertaining to any sample should be checked by two men. This point cannot be stressed too much.

PREPARATION OF SAMPLES

After the sample has been selected by one or the other of the methods described, it may be prepared by one of several different schemes, depending on a number of conditions, governed (1) by the facilities at hand; (2) by the weight and approximate value of the lot; (3) by the size and character of the material. The methods at this stage of final preparation comprise melting, screening, and matteing.

MELTED SAMPLES

Melting is the method generally used. The material, either dried or undried, may be charged directly into a graphite crucible or the fines may be screened out and only the coarse material melted, with or without prior removal of the iron.

SCREENED SAMPLES

Material suitable for screening is usually dried first, for obvious reasons. It may also need grinding or crushing in a mill or possibly by a jaw-crusher and set of rolls. Sieves 30 to 60 mesh are used, dividing the samples into portions called fines and metallics, or pulp and scales.

It is generally advisable to assay each portion separately. The iron in the scales, shot or metallics should usually be removed with a magnet. No attempt should be made, however, to remove iron in this way from the fines or pulp portion.

It may be good practice to melt the course portion if it

* Part 1 appeared in the issue of June, 1928.

is sufficiently large and unhomogeneous. Before and after melting, weights should be taken. In melting, it may be advisable to add a small amount of borax, but it rarely is necessary to weigh or analyze the small amount of such slag.

MATTED SAMPLES

For irony material, this method, when it can be conveniently used, is best of all from the standpoint of accuracy. When properly carried out the resultant matte can be crushed, pulverized and thoroughly mixed. Only one determination of copper is necessary and the buyer's and seller's assays should and do check within 0.25 per cent or less. It is peculiarly suited for irony material but the cost is high and very few smelters have facilities for getting a high enough heat, so that often a slag will contain free metal. This slag must be ground and separated into fines and shot, making three portions of the sample to be assayed. The final result, though more nearly correct, may have increased the sampling costs beyond reason.

On the other hand, some samples have so much iron not readily removed except by melting that, despite the care used in skimming after sweating, the resultant bar contains hard spots, which easily break a drill. Such a bar must be remelted with additional flux, thus giving two slag weights and two A. M. weights for the bar, with a consequent increase in labor and fuel cost and still further chance for clerical errors and losses.

ALUMINUM SCRAP, DROSSES AND SKIMS

Aluminum scrap is rarely sold on joint sampling at the works of the buyer. One of the largest works handling this confines its purchases chiefly to material of which the origin and composition are known.

Drosses and skims, however, require some form of sampling, as they are sold on the basis of "metallic or free aluminum," no payment being made for the oxide. Up to recent times the practice has been to draw a sample by either the grab or shovel method, reduce in quantity, crush somewhat if necessary, and screen through a 60-mesh sieve, discarding the fines obtained and fluxing only the coarse.

The free metal having settled to the bottom of the crucible, the heat is continued a few moments and the crucible removed, cooled and broken. After cleaning, the button may be sawed for purposes of analysis. As a rule, only the aluminum is paid for, but the button may contain other metals present in the original alloys; copper, for instance.

Tests made in our laboratory with zinc chloride and calcium fluoride, the usual fluxes given out in the trade, indicated that the finely divided metal contained in the portion under 60-mesh was not recoverable. We have reason to believe that a change in the method of fluxing would partly avoid oxidation of particles as fine as 80 mesh.

BRASS AND COPPER SKIMMINGS

This material will usually contain metallics of appreciable size. It may be sampled by hand by the tenth shovel, or "one and nine," as it is sometimes called, or it may be passed through an ore-sampling mill. The latter is a distinct innovation in sampling practice as applied to this class of material. The mill is used only for carload lots.

As in hand sampling, large metallics should be picked out and broken with a sledge. If there are many of these, they should be weighed and a proportionate amount added to the main sample as delivered from the last cutout used in the mill; if few, they may be broken up and thrown in with the rest of the material. The mill is equipped with four cutouts (any one or all can be used), each giving a 20 per cent cut. If the particles are of sufficient size, the material may be passed through a jaw-crusher, gyratory crusher and three sets of rolls in the order given. The full use of the cutouts will give a sample equivalent to 1/625 of the lot with a weight ranging from 150 to 250 lb. Depending on the setting of the final rolls, the maximum particle size will vary from 0.25 to 1 in. This sample may then be passed through a laboratory-size crusher, quartered once or twice as needed and melted to a bar and slag.

Ashes, cinders, clinkers, cobbing concentrates, drosses, muds, residues, slags, fine spatters, sweepings, tailings and washings are sampled in a like manner except that they need no crushing, as they contain only fine material. They should be screened and assayed "as received" and not melted.

LEAD DROSSES AND SKIMMINGS

Waste of this type may be sold on the "metallic button" or total lead content basis. In either case, after a sample is obtained by the shovel method, it is melted down under a reducing flux.

If the contract calls for "metallic," most of the lead, tin and antimony will be in the button, together with some of the impurities such as copper, arsenic, etc. If "total lead" is called for, both the button and slag are assayed and the flux used is of a more simple nature, no care being taken in reducing other than to get a clean slag, which may contain as high as 50 per cent lead. In the "metallic" melt, the flux is highly reducing, the losses of metal retained in the slag being partly compensated for by the somewhat impure button thus obtained.

This article will be continued in an early issue.—Ed.

Reclaiming Cadmium from Dross

Q.—In making cadmium anodes we get dross, rich in metal. We can get this down to a slush but is seems impossible to pour out any particle of it. Do you know of some agent we can apply to make it run?

A—Cadmium behaves metallurgically almost the same as zinc and the best way to recover the metal is by distillation in a retort. In your case we would suggest melting under a ferrous monosilicate slag. Make up a flux composed of soda ash, 30; silica, 30; lime, 10; flourspar, 10; soft coal, 10; iron sulphite, 5; salt, 5.

Use 20% of this flux and place the metal and flux in a crucible and melt. You should make a fair recovery. When melting cadmium keep it well covered with borax and you will not make near as much dross.

—W. J. Reardon.

Data on Soft Metal Castings

Q.—What books are there on soft metal casting and permanent molds?

A.—There is no book which specializes in the handling of soft metal casting and permanent molds. We can only suggest that you look through your files of The Metal Industry, in which there is considerable material.

—W. J. Reardon.

Society for Testing Materials Meets

Papers on Wear Testing of Metals Are Feature of Thirty-First Annual Meeting, Held at Atlantic City, June 25-29

The thirty first Annual Meeting of the American Society for Testing Materials was held at Chalfonte-Haddon Hall, Atlantic City, N. J., June 25-29, 1928. The meetings contained a number of sessions of particular importance to those interested in metals.

Three papers on wear testing of metals were the most important feature of the testing session, held on Tuesday, June 26, at 8 P. M. A session covering corrosion, fatigue and properties of metals at elevated temperatures included papers on these topics which are uppermost at this time in the minds of metallurgists. A detailed list of papers (and abstracts) on metals is given below.

The Charles B. Dudley Medal was given to A. V. de Forest, research engineer of the American Chain Company of Bridgeport, Conn. This medal, which was established for recognition of meritorious papers on research in engineering materials, was given to Mr. de Forest for his paper, "A Method of Graphic Representation of Magnetic Characteristics," read at the annual meeting of the Society in 1927.

The Marburg lecture was delivered by Dr. Frank B. Jewett, president of the Bell Telephone Laboratories. The lecture discussed "Some Research Problems Involved in Transoceanic Telephony."

Committee B-2 on Non-Ferrous Metals, which has been very active during the past year, held a meeting in New York on March 21st to take action on new standards and tentative specifications. The committee is submitting new specifications for fire-refined copper, other than lake, for seamless copper tubes, for sand castings of the alloy copper 80 per cent, tin 10 per cent, lead 10 per cent; also for silver solders. Several tentative specifications are being recommended for advancement to standard, covering brazing solder, aluminum bronze castings, brass or ounce metal sand castings, yellow brass and castings for general purposes, bronze castings and car and tender journal bearings. The committee further recommends that the standard specifications for brass ingot metal for sand castings be revised and published as a tentative standard.

A very comprehensive series of co-operative tests on both aluminum base and zinc base die castings is being carried on by Sub-Committee XV on Die Cast Metals and Alloys. One of the economies possible in large scale production of similar parts is that resulting from the use of identical castings formed by the use of pressure in metal molds. Such die-cast parts can be produced to exact dimensions, with cast threads or with other materials cast as inserts. In view of the desire of certain large consumers for dependable information on the properties of alloys suitable for die-castings, information which, in many cases, is not in the possession of the manufacturers, the investigation was undertaken. The aluminum-base alloy test program involving 50,000 specimens is well along towards completion and a similar program involving about one-half as many zinc-base specimens has been begun.

Materials and services were contributed on a large scale by both the largest producers and consumers in the field. Standard specimens and standard methods of test were adopted to enable various co-operating laboratories to obtain similar results on similar specimens. In addition to the common physical tests such as strength, hardness and brittleness, information is being accumulated on the corrosion resistance of the alloys.

Papers of special interest to metal industries were as follows:

TESTING, WEAR TESTING OF METALS

TUESDAY, JUNE 26, 8 P. M.

Calibration of Rockwell Hardness Testing Machines by F. S. Mapes described experimental methods of calibration leading to the final method presented in the paper. The method was discussed from the point of view of practicability, accuracy and simplicity of operation.

The Calibration of Extensometers by R. L. Templin presented a brief review of the present devices used to calibrate commercial extensometers. A new design of calibration device suitable for extensometers arranged for measuring deformations on gage lengths on ½ to 10 inches was described in some detail. Calibration data pertaining to the micrometer screw were included with results obtained on several types of commercial extensometers.

Measurement of Brittleness by P. L. Irwin described a machine for determining brittleness of metals, developed in connection with a study of hydrogen brittleness. It was shown that ultimate strength in cross bending is a measure of brittleness, and a method of removal of hydrogen brittleness was described.

Wear and Other Properties of Some Railroad Bearing Bronzes at Different Temperatures by H. J. French presented comparisons based on wear and various mechanical tests of bronzes containing various percentages of lead and tin. The different types of wear tests were described and information given by each was discussed in relation to the application of the different bronzes. It was shown that no one type of wear test gives adequate information for a proper comparison of the wearing properties of bearing bronzes.

METALS: CORROSION, FATIGUE AND PROPERTIES AT ELEVATED TEMPERATURES

THURSDAY, JUNE 28, 9:30 A. M.

Report of Committee A-5, on Corrosion of Iron and Steel—J. H. Gibboney, chairman, presented reports on atmospheric and total immersion on tests. It presented new specifications for zinc coated (galvanized) steel wire strand and zinc coated (galvanized) barbed wire. It reported, also, inspection of the test racks on field tests of galvanized products at five locations.

Report of Sectional Committee on Zinc Coating of Iron and Steel—J. A. Capp, chairman, presented specifications for zinc (not galvanized) coatings on structural steel shapes, plates and bars and their products; also specifications for the zinc coating on iron and steel sheets. The committee reported progress in other phases of its work, especially of standards for zinc coating of pipe and of wire and wire products

Some factors Involved in Corrosion and Corrosion-Fatigue of Metals by D. J. McAdam, Jr., discussed cor-

rosion-fatigue under alternating torsion, corrosion-fatigue as affected by kind of water, effect of size of specimen, atmospheric corrosion-fatigue, influence of cyclic stress, effect of number of cycles, effect of cycle frequence and influence of electro-chemical and physical properties on corrosion and corrosion-fatigue of metals.

Influence of Inhibitors and Accelerators on Corrosion-Fatigue of Metals by F. N. Speller, I. B. McCorkle and P. F. Mumma, presented results of an investigation on the influence of well-known inhibitors on corrosion-fatigue in which the test specimens were continuously wetted with a thin stream of a standard synthetic water made up of distilled water carrying NaCl and Na_2SO_4 and saturated with oxygen. With this water the endurance limit of standard grade steel dropped to 22,000 lb. per sq. in. from 35,000 lb. per sq. in. in air. On adding sodium dichromate to the water the corrosion-fatigue limit rose nearly to the value of the endurance limit in air.

Testing of Materials at Elevated Temperatures by P. G. McVetty discussed the general subject of materials testing as a basis for choice of materials and working stresses to be used in applications at elevated temperatures. The short-time and long-time tension tests are discussed in detail, including test methods, possibility of errors, and interpretation of results. The subject of accelerated tests was taken up with a discussion of the value of such tests as a basis for design.

The Seizing of Metals at High Temperatures by N. L. Mochel described a machine for the testing of various materials and combinations to determine whether such materials will operate in contact with each other without seizing. The paper gave the results secured with a large number of materials and illustrated the several types of action found. All tests were carried out at 750° F.

Report of Joint Research Committee of A. S. M. E. and A. S. T. M. on the Effect of Temperatures on the Properties of Metals—G. W. Saathoff, chairman, gave a report of progress of research that has been carried on during the year in studying the tension testing of metals at high temperatures.

NON-FERROUS METALS AND METALLOGRAPHY

THURSDAY, JUNE 28, 8 P. M.

Report of Committee B-1 on Copper Wire—J. A. Capp, chairman, gave a report of progress recommending organization of a sub-committee to study specifications for wire and cable for electric power lines. Functioning as the Sectional Committee on Copper Wire the committee reports the submission of the Specifications for Hard-Drawn Copper Wire for Approval by the A. E. S. C. as American Standard.

Report of Committee B-2 on Non-Ferrous Metals and Alloys—William Campbell, chairman, presented new specifications for sand castings of the alloy 80-10-10 for silver solders, for fire-refined copper other than lake and for seamless copper tubes. This committee submitted the revisions for five standards and one tentative standard and recommended the advancement to standard of eight tentative specifications. As a result of discussion and investigation the word "spelter" will be replaced by the term "slab zinc (spelter)."

Some Mechanical Properties of Nickel, Manganese-Nickel and Copper-Nickel Alloys by W. A. Mudge and L. W. Luff presented data in which mechanical properties in tension, torsion and impact, together with corresponding Rockwell, Brinell and Scleroscope hardnesses were given, as hot rolled and as annealed, for commercially pure nickel, for alloys of manganese and nickel, containing 2.00 and 4.50 per cent of manganese respectively, and for copper-nickel alloys of the Constantan type. The sizes of rods range from ¾ to 3 inches inclusive.

Tension Tests of Copper with Varying Dimensions of Test-Specimen by C. H. Marshall presented results of tests made on both hard-drawn and annealed copper sheet varying in thickness from 1/64 to ¼ inch. More than 1,700 specimens were tested and curves have been plotted from the results for the purpose of showing the effect of variations in size and shape of test specimen.

Report of Committee B-4 on Metallic Materials for Electrical Heating—Dean Harvey, chairman, presented a new method for the determination of sulfur to be added to the tentative methods of chemical analysis of metallic materials for electrical heating. It reported further developments of the life test for durability of electrical heating wires at high temperatures, and a test for uniformity of temper. A study of the phenomenon known as "growth" indicates that it is in reality plastic deformation caused by externally applied stresses.

Report of Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys—T. S. Fuller, chairman. Reports were made of progress on the activities of the committee.

Reclaiming Zinc

Q.—For the past several years we have been in the manufacture of a variety of associated articles, made in whole or in part, from remelted die castings. As you know this scrap includes about all known alloys in white metal, but for the purpose used, is quite satisfactory, with the exception, that we encounter too much shrinkage in certain of our castings. I might say that all our castings are hand poured.

We have found that by sweating at a temperature just above melting, we get a metal that is probably mostly zinc, that casts without shrinkage. The remainder when heated to a higher point casts readily in some other dies. We would like to know the best known method of zinc extraction from scrap die cast (white metal) that can be had in a small unit. We have read with a great deal of interest the articles by Edmund R. Thews, his first article appearing in your February, 1927, issue. However, this article relates more to the extraction of zinc from sheet zinc.

A.—There is no easy way of separating zinc from white metal better than the one you describe; namely, sweating or liquating. A furnace should be constructed so that you could control the temperature and sweat the zinc from the white metal and let it run into a receiving pot. The residue is then melted and used to the best advantage. There is the Johnson Electric Furnace for melting zinc which was described in the METAL INDUSTRY, June, 1912. The distillation from retorts is a big installation and all these furnaces are expensive and require a large tonnage to operate properly.—W. J. REARDON.

Electroplating on Aluminum and Its Alloys

From a Paper Presented at the Fifty-third General Meeting of the American Electrochemical Society, Held April 26, 27, 28, 1928 — Conclusion[1]

By HAROLD K. WORK

Industrial Fellow, Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Pa.

PLATING ON A ROUGH SURFACE

Tests have been made on the use of the sand blast indicating that the processes involving sand blasting would probably be successful if the correct fineness of sand and the proper air pressure were chosen for the particular alloy. Objections to this process are found in the equipment required, and in the introduction of another color of metal, which appears on wearing, by the copper layer which is used to prevent peeling when nickel is the desired coating.

For the average plating shop chemical etching is therefore more suitable. The assistance of an electric current in the etching has been considered, but is superfluous.

Etching solutions which have given the best results may be divided into three general classes, as follows: (1) Acid dips with high metal content; (2) Acid dips with low metal content; (3) Acid dips without added metal. Each of these groups has certain characteristics that make it particularly effective for certain of the alloys. A few of the typical examples of each group are shown in Table II.

The high metal dip differs from the other dips in that the roughening of the metal is accompanied by the formation on the aluminum of an immersion layer surface. This layer greatly facilitates plating. The dip accomplishes some of the roughening by attacking

TABLE II—COMPOSITIONS OF ETCHING SOLUTIONS

	Water	Hydrochloric Acid (sp. gr. 1.18)	Metal
High Metal Dip			
Ni Dip 1	805 cc./L. (1 gal.)	89 cc./L. (0.11 gal.)	226 g./L. $NiCl_2.6H_2O$ (37 oz.)
Low Metal Dip			
Fe Dip 1*	500 cc./L. (0.5 gal.)	500 cc./L. (0.5 gal.)	1 g./L. Iron (0.125 oz.)
Ni Dip 2	667 cc./L. (0.67 gal.)	333 cc./L. (0.33 gal.)	4 g./L. $NiCl_2.6H_2O$ (0.5 oz.)
Mn Dip 1†	500 cc./L. (0.5 gal.)	500 cc./L. (0.5 gal.)	4 g./L. $MnSo_4.2H_2O$ (0.5 oz.)
Acid Dip			
3 parts nitric acid, sp. gr. 1.42. 1 part hydrofluoric acid, 50 per cent.			

*U. S. Patent 1,030,972.
†Ann. Chem. Anal. (2), 2, 335 (1920).

through the pores of the immersion layer. When pits are formed they are quite large, and often undercut with smooth areas between them. This makes an excellent anchor for holding the plate on the aluminum. Deposits as thick as 0.38 mm. (0.015 in.) have been applied to 2S aluminum, and on bending the nickel broke in small pieces rather than flaked off. The dip also does not require close control, for relatively large changes, as much as 20 per cent sometimes, in the time of dip or in the composition of the solution do not greatly reduce the effectiveness of the dip. Occasionally, however, acid and nickel chloride must be added to maintain the original proportions. Titration is employed to control the acidity, and clorimetric methods may be used for the nickel content. Copper impurities in the nickel chloride may cause the nickel immersion deposit to be dark when the dip is new, but this discoloration will work out in time. Adding at first a few scraps of aluminum to the dip speeds up the removal of the copper. This type of dip has one serious fault. It cannot be used for all of the alloys. Even small amounts of alloying materials usually cause it to produce inferior plates. The procedure is limited, therefore, mainly to use for 2S aluminum.

The low metal content dips are probably the most generally applicable to all types of alloys, but they do not give as satisfactory results as other dips for 2S and alloys with a eutectic structure. The roughening action is not quite as good as that obtained with the high metal dip, and the absence of the metal layer after dipping is a disadvantage in plating. This type of dip finds its greatest application on those alloys which are inherently most resistant to corrosion, and consequently require least roughening to anchor the coats.

In general, the actions of the nickel, iron, and manganese dips are much the same. There are, however, slight differences that deserve mention. Where articles are being dipped in very rapid succession the nickel dip tends to heat up, begins to act on the aluminum more rapidly, and gradually loses its green color by precipitation of the nickel. On standing for a time the nickel redissolves and the dip again operates satisfactorily. The iron dip behaves similarly, though to a less extent. The manganese dip is even less affected. In addition, the manganese dip may be used for 3S alloy and obviously, has the advantage of the widest application.

The acid dip, which has been used commercially, was next studied and its particular application found in such alloys as have a eutectic network structure. The mixture of nitric and hydrofluoric acids attacks quite rapidly the constituent in the network containing the least aluminum and leaves the high aluminum part. This gives an excellent roughening where the network is fine, as in the case of die castings; but where there is a large enough amount of the alloying material, it may even be used where the structure is coarse, as in some of the sand castings.

ROUGHENING PROCEDURES

2S Aluminum. This may be plated after roughening with either the high metal content dip or the low metal content dip, but the former is more satisfactory. This is particularly true when objects have been formed into irregular shapes. For this reason, a 60-second dip in Ni 1 dip is advised as being most satis-

[1] The first part of this paper was published in the June, 1928, issue.

factory, although the following have given fair results in the other dips: Mn 1, 40 sec.; Ni 2, 60 sec.; Fe 1, 30 sec. This high metal dip is one of the simplest to operate. The only time that it is at all likely to fail is when the article is made from very hard rolled material.

3S Aluminum. The high metal content dip, successful for plating on 2S aluminum, proves undesirable for this alloy. It does produce a coat of satisfactory superficial appearance, but the plate peels off rapidly on exposure to salt solutions or to the outdoor atmosphere. For better results on this alloy, the low metal content dips may be used, except that the iron and nickel ones unduly roughen the surface. From all standpoints, consequently, the manganese dip (of 15 to 20 seconds) is most satisfactory. This is explained, no doubt, by the fact that the manganese in the metal assists that in the dip to give a fine and uniform etch.

Strong Alloys. In general, the low metal content dips are best suited for plating on the strong alloys. It is possible, however, to obtain good deposits on some of these alloys with the high metal dips, as well, although with these, the plates are less reliable, especially for manufactured objects. This is perhaps due to the lack of uniformity in the heat treatment of the manufactured articles. But regardless of which type of dip is used with these alloys, it is the condition of the metal that is of more significance than the plating procedure itself. This is true because the value of the plate parallels the corrosion resistance of the metal coated. For instance, no nickel plate has been obtained on 17 SH that does not peel on exposure to salt solutions or to the outdoor atmosphere, except when the metal is so severely etched that it is disfigured. Plates can be obtained on the metal in the T condition, however, that resist salt solutions for many weeks with no appreciable corrosion. Briefly, the dips that have been successfully used for these strong alloys are shown in Table III.

TABLE III—ROUGHENING OF STRONG ALLOYS

Alloy	Dip	Time, sec.	Corrosion Resistance
17 ST	Ni 2	45	Excellent
25 SO	Mn 1	10	Poor
SH	Mn 1	10	Poor
SW	Mn 1	25	Excellent
ST	Mn 1	10	Very good
51 SO	Mn 1	20	Fair
SH	Mn 1	60	Fair
SW	Mn 1	60	Excellent
ST	Mn 1	60	Very good

Die Castings. For the die casting alloys 13, 73, 83, 85 and 93, the roughening of the surface, so necessary for successful plating, is easily accomplished by the acid dip. This removes one constituent of the eutectic network, leaving an excellent surface for plating. A dip of thirty seconds is advised for this action on all the die castings, but the time may be varied considerably and still produce satisfactory results. The proportions of the acids used may also be widely varied without decreasing the effectiveness of the dip.

Sand Castings. Three typical sand casting alloys have been plated. No. 47 consists of a combination of areas resembling 2S and areas like die castings. The procedure for die castings is followed, but a longer dip (90 seconds) is necessary for complete adhesion. No. 112, on the other hand, has quite a different structure. The zones in it that are rich in the alloying constituent cut the surface only at infrequent intervals. Attack of even these limited areas by a two-minute acid dip, however, gives sufficient pits to hold the plate on well enough for any mild service. That is, a nickel plate of 0.013 mm. (0.0005 in.) begins to fail after about seven days in salt solution. This is, of course, inferior to most of the other plates under discussion. Alloy No. 195 does not have enough areas cutting the surface to allow use of the acid dip at all. Since, however, it resembles 17 ST, the same type of dip as is used for the strong alloy was tried successfully. Fig. 11 shows that the surface is not greatly roughened and yet the product is corrosion resistant.

PLATING PROCEDURE

Where the surface has been first roughened, nickel appears to be the most workable metal for the foundation coat. However, selection of the bath that produces this coat is, strange to say, of minor importance, since almost any nickel bath will give a satisfactory deposit if correctly used. Various ones can therefore be recommended for use on aluminum; neutral baths, chloride-free baths, and baths with a material added to increase the cathode polarization. This subject has been discussed above in the section entitled "Principles Involved." In general, any nickel bath that operates satisfactorily for zinc is acceptable for use on aluminum. Three recommendations are given in Table IV.

TABLE IV—NICKEL PLATING BATHS

	g./L.	oz./gal.
Nickel Bath 1		
Nickel sulfate, $NiSO_4.7H_2O$	120	16
Sodium sulfate, Na_2SO_4	195	26
Ammonium chloride, NH_4Cl	15	2
Boric Acid, H_3BO_3	15	2
Nickel Bath 2		
Nickel sulfate, $NiSO_4.7H_2O$	140	19
Magnesium sulfate, $MgSO_4.7H_2O$	75	10
Ammonium chloride, NH_4Cl	15	2
Boric Acid, H_3BO_3	15	2
Nickel Bath 3		
Nickel-ammonium sulfate, $NiSO_4.(NH_4)_2SO_4.6H_2O$	75	10
Sodium chloride, NaCl	53	7
Sodium citrate, $2Na_3C_6H_5O_7.11H_2O$	7.5	1
Boric Acid, H_3BO_3	15	2

The first two of these solutions are well known. The third one was recommended by George B. Hogaboom. It gives excellent deposits that are white even in the recesses of profiled objects. The second solution is often modified by the substitution of double nickel salts for part of the single salts. All three may be further modified to use under a wide variety of conditions, but the following are recommended as good starting points:

Bath	Current Density Amp./sy. dm.	Amp./sq. ft.
Ni 1 and 2	1.5	14
Ni 3	0.8	7

The application of a high potential at the start of plating is beneficial for some alloys, but not absolutely necessary. A moving cathode rod allows faster plating. pH 6 gives good results.

PROCESSES RECOMMENDED

Although the plating processes have already been indicated under various headings, this section serves to segregate the individual steps of the complete procedure in a skeleton outline, and also presents a tabular summary of results in Table V. A previous section of this paper on cleaning procedures explains the abbreviations used.

TABLE V—PLATING PROCEDURE FOR EACH ALLOY

Abbreviations used are explained in section on "Cleaning Procedure"

	Degrease		Make Uniform		Roughen		
Alloy	Treatment	Time sec.	Treatment	Time sec.	Dip	Time sec.	Plate
Any Alloy	..	..	A.C.	60	..	..	Zinc
2 S	..	..	A.C.	40	Ni 1	60	Nickel
3 S	..	..	A.C.	40	Mn 1	17	Nickel
17 ST*	..	..	A.C.	15	Ni 2	45	Nickel
25 SO	M.A.	30	P.D.&A.C.	..	Mn 1	10	Nickel
25 SH	M.A.	30	P.D.&A.C.	..	Mn 1	10	Nickel
25 SW	M.A.	30	P.D.&A.C.	..	Mn 1	25	Nickel
25 ST	M.A.	30	P.D.&A.C.	..	Mn 1	10	Nickel
51 SO	D.M.A.	30	.....	..	Mn 1	20	Nickel
51 SH	D.M.A.	30	.....	..	Mn 1	60	Nickel
51 SW	D.M.A.	30	.....	..	Mn 1	60	Nickel
51 ST	D.M.A.	30	.....	..	Mn 1	60	Nickel
Die Castings: 13, 73, 83, 85, 93.	M.A.	30	.....	..	Acid 1	30	Nickel
Sand Castings:							
47	O.S.	..	.....	..	Acid 1	90	Nickel
112	O.S.	..	.....	..	Acid 1	120	Nickel
195*	O.S.	..	A.C.	..	Fe 1	25	Nickel

*It is believed that Mn dip 1 may be used for these alloys, thus making only 3 different dips necessary for all the alloys, but the tests are not yet complete.

SKELETON OUTLINE OF TYPICAL PLATING PROCEDURE

1. *Remove grease (M.A.) (O. S.) (P. S.)
2. Rinse with clear cold water.
3. Make surface uniform (A. C.) (P. D.).
4. Rinse with clear cold water.
5. Roughen surface.
6. Brush off adhering particles or dissolve dark metal stains (B.) or (P. D.) (optional).
7. Rinse with clear cold water.
8. Plate first layer with most suitable metal.

*Frequently steps 1 and 3 may be combined.

Again it must be remembered that almost innumerable variations in these procedures are possible, but a summary of one successful process for each alloy is presented here for guidance. It can be assumed that the unplated specimens used are reasonably free from grease, except the castings alloys, which are polished.

When adopting these procedures for use, it must be borne in mind that the dipping is the important step. The most suitable time of dip has to be determined for each particular application. The above figures are useful guides, but no more. They must be revised each time they are used to correct for variations in the temperature of the dip, the purity of the chemicals, and the degree of passivity of the aluminum surface. Every attempt to apply the procedures for the first time must always be accompanied by both adhesion and corrosion tests.

In some plating work, where large articles must be immersed, it may be found that the time of dip is too brief to permit uniform attack of the top and bottom of the objects. Under these circumstances, the dip must be diluted and a longer time of dipping employed.

PROPERTIES OF DEPOSITS

The adhesion and accelerated corrosion tests, referred to previously in this paper, are presented collectively in Table VI. The plate under discussion is 0.013 mm. (0.0005 in.) thick.

It will be noted from Table VI that some of the alloys show good corrosion resistance even with poor adhesion. This is probably explained by the inherent corrosion resistance of the alloy. With most of the alloys, however, it is necessary to have good adhesion in order to secure good corrosion resistance.

It may also be stated that the outdoor exposure tests on the specimens are even more favorable than the accelerated corrosion tests. Such exposure tests of six months to one year in duration on specimens of nickel plated 2 S, 17 ST, and die castings indicate excellent corrosion resistance. Even where a few spots of oxide have appeared on the surface, the wind and rain have removed them. The explanation is, no doubt, that the aluminum becomes passive.

TABLE VI—PROPERTIES OF DEPOSITS

Plated by Procedure in Previous Section. Plate = 0.013 mm. (0.0005 inch).

ADHESION. (1) No separation. (2) Slight chipping sometimes. (3) Slight peeling. (4) Very slight peeling.

Alloy	Plate	Adhesion	Corrosion in Salt Solution Test
Anyone	Cu over Zn*	(1)	Blisters in 1 day.
Anyone	Cu over Zn (heat treated)	(1)	Severe pitting in 3 weeks; plate adherent at edges of pits.
2 S	Ni	(1)	Extensive pitting in 3 weeks; plate slightly non-adherent at edges of pits.
3 S	Ni	(1)	As previous.
17 ST	Ni	(2)	Hardly any pitting in 6 weeks.
25 SO	Ni	(1)	Extensive pitting in 2 weeks.
25 SH	Ni	(1)	Extensive pitting in 2 weeks.
25 SW	Ni	(3)	No pitting in 2 weeks.
25 ST	Ni	(1)	Very slight pitting in 2 weeks.
51 SO	Ni	(1)	Extensive pitting in 3 weeks.
51 SH	Ni	(1)	Extensive pitting in 3 weeks.
51 SW	Ni	(4)	No visible pitting in 3 weeks.
51 ST	Ni	(1)	Slight pitting in 3 weeks.
Die Castings 13, 73, 83, 85, 93	Ni	(1)	Deep pitting in 4 weeks; nickel adherent at edges of pits.
Sand Castings 47	Ni	(1)	Pitting in 3 weeks, but nickel adhered at edges of pits.
112	Ni	(3)	Slight attack in 7 days, a little flaking nickel in 3 weeks.
195	Ni	(1)	A very little flaking in 3 weeks.

*Zinc 0.00051 mm. (0.00002 in.), copper 0.013 mm. (0.0005 in.).

The Charge of the Light Brigade

The Adventures of Two Prominent Metal Finishing Experts in the Wilds of New England

By FREDERIC B. STEVENS
President, Frederic B. Stevens, Inc., Detroit, Mich.
WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

This story is not related to the great battle made more historic by Mr. Tennyson's famous poem, the name of which is here appropriated but only to lend a little more interest and to show also how a very light brigade can make quite a heavy charge.

To those who know Bradford H. Divine of Utica, N. Y., as a successful manufacturer of very excellent cotton buffing wheels, as an astute business man and engineer, but who do not know his social side, much has been missed. It came to pass, a few days ago, that he, with generous impulse, invited a business friend, of the garden variety of the genus homo, who lives in the Middle West, to meet him at the Utica railway station on arrival of a certain early morning train from Detroit. The benign purpose was a motor trip over many hills, to Boston.

FREDERIC B. STEVENS

At seven-fifteen on that beautiful June morning that Rolls-Royce car began the journey noiselessly as a Vacheron watch and unrolled nature's moving picture, more beautiful than the deftest artist paints; while those two tired business men became boys again and vied with each other in swapping fairy tales with no one on the back seat to say, "My! what a whopper," or to murmur gently "Nay!"

Clayville was passed where the soil seemed to verify its name and the speedometer worked overtime as its pointer left behind that sometimes fatal fifty. The smoke of densely crowded factories and the hurry and bustle of over-populated cities were lost in the panorama. Even Sheridan's ride at its height was out-distanced and out-run.

In Pittsfield was a rare and beautiful sight, now sadly missing, a young miss on her way to school, with fluffy, golden brown hair ribboned at the back of her neck and loosely hanging down her back. Courageous, lovely, little girl!

Somewhere in a peaceful little valley as we descended a rugged mountain there burst upon our view, as story writers say, an old tavern, its ancient appearance still preserved, its swinging sign still swinging and its hand forged iron knocker still on its broad front door. Numberless cars parked opposite indicated its present hospitality. There we tarried and alas! there we met the charge of that blonde brigade. Just off the front hall is the old-time barroom where tired stage coach travelers once renewed their vigor with aid of hot whiskies, New England rum toddies, cider brandy and cherry bounce, the latter noted for the activity which the name indicates. Placidly seated behind that bottleless bar, was Priscilla, a Puritan maiden of today; youthful and innocent, light in structure, hair and complexion, but as merciless as that daring and dauntless few at Balaklava.

He who had fearlessly faced grizzlies and glaciers surrendered. When he asked to pay for two noon meals, that piece of Puritan perfection softly said, "Five dollars, please." "No," he replied, "not four meals, only two; we are light eaters." Still she murmered, "Five dollars, please." After that surgical extraction and financial capitulation, we wandered through that quaint old hostelry. What a place for a revel by my lady gay who, in these days of prosperity, pays fabulous prices for things antique. There are Chippendale chairs, high-boys, low-boys, candlesticks and snuffers, pewter spoons and plates which, could they speak, might disclose interesting histories of generations long gone and forgotten.

In that dining room we beheld a certain peculiar physical type of New England femininity, most demure and formal, tall and angular but excellent in execution when serving meals to a voracious public. Here the blandishments of the debonnair commercial traveler, the presence of the show-off cigarette smoking flapper are not tolerated. Altogether, our brief sojourn at that old Colonial tavern was, as the old circus posters stated, "well worth the price of admission."

Then on to Boston over excellent roads where chickens and old hens flew sidewise and endwise to avoid that fleeting car, and even a woodchuck crossed the road with hurried feet.

Ranges of hills, and long lines of mountains in the background with their azure robes of blue, their rugged tops lost in the clouds, were all too rapidly passed as that perfect piece of mechanism carried us along.

After that rejuvenating inhalation of fresh ozone in that glorious country with its scenes of nature's beauty, the hurry, bustle, and congestion of Boston's streets, like every other city's streets, seemed all the more confusing.

Here, as in every mart of trade, men and women see daily the inside of four walls, artificial light, breathe the dust-laden air and toil whether amid the factories' whirl or in richly furnished offices. What for? Some for a hovel with a slattern for a wife; some for a home in an apartment of dry goods box size, and where the domestic partner has nothing to do; some for stocks and bonds or for a house, big enough for an orphan asylum, a power boat, half a dozen automobiles, and social position thrown in, with the meretricious satisfaction that all that is a little more and a little better than the next door neighbor's. The end of it all is a space six feet by four and the rattle of the gravel on the cover of that pine box.

Vanitas Vanitatum! if they only knew what gorgeous country is just outside.

No! I am not proselyting for the gypsies; merely expressing my appreciation of my companion's thoughtfulness and advocating a return to nature now and then, even if one has to walk or risk an encounter with the charge of another light brigade.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

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Editorial

An Outstanding Platers' Convention

The Sixteenth Annual Convention of the American Electroplaters' Society made records for the Society in several respects. It was one of the big conventions in attendance; it was outstanding in the number and quality of the papers read. It was one of the jolliest ever held; and it was the occasion of a tribute to Dr. William Blum, of the Bureau of Standards, which touched not only the recipient but the donors and the spectators. A gold watch was presented to Dr. Blum by the American Electroplaters' Society as a token of their admiration and gratitude for his unremitting efforts toward the improvement of electroplating as a science and industry, and the education of the electroplaters. No gift was ever so richly deserved; no labor was ever given more unselfishly and modestly than Dr. Blum's. No industry has ever had more faithful service than electroplating has had from Dr. Blum.

Congratulations are also due to the prize winners of 1928, Mr. Hogaboom, who took the Founder's Gold Medal and the first prize for the best paper read during the past year; Mr. Nixon, 2nd prize; Mr. Van Derau, 3rd prize; Messrs. Barrows and Hay, honorable mention. Prizes for the best exhibits went to Mr. Allen, Mr. Gardener and Mr. Drund, in order.

The present and future of the electroplating industry are bright. Electroplating has had an impetus in the past two or three years which will carry it far. But the most encouraging feature of the whole situation is the interest, energy and loyalty displayed by the platers, individually and collectively, through the American Electroplaters' Society.

A New Field for Metals

The International Exposition of Art In Industry, recently held in the Exhibition Galleries of R. H. Macy and Company, New York, was an eye-opener in showing what could be done in making beautiful objects out of prosaic materials and how these materials could be used to beautify surroundings which had hitherto been left unlovely. Ordinary factory building materials such as strip copper, nickel silver and brass were arranged by Lee Simonson, the architect of the Exposition, in a decorative scheme, in vertical angular arrangement into doorways and columns, giving effects that were extraordinary.

Of even more interest than the architect's ingenuity was his prediction that metal furniture would be used in the American home of the future. According to Mr. Simonson, the use of metal in the construction of furniture has obvious advantages for the modern, limited space home. A satisfactory effect can be obtained without massiveness. Furthermore, metal furniture can be made of movable, interchangeable units, and can be made cheaply by mass production processes. There is little or no danger of monotony or standardization because individuality can be shown in design. Wood finishes can be imitated, but in many cases metal finishes may be more desirable.

Metal furniture, hidden under a wide variety of finishes is common in offices. Recently, also, the Aluminum Company of America put out a wide variety of samples of aluminum chairs. These chairs were designed primarily for office use, but there is no reason why they could not be made suitable for homes.

From the standpoint of utility and permanency, metal would be preferable as it would last indefinitely and breakage would be practically non-existent. Pieces damaged by bending could be straightened and the finish could be restored.

For convenience, the question of weight would enter, and the design of the furniture would play a considerable part. Obviously, however, aluminum would have a great preliminary advantage over other materials.

The question of beauty would be taken care of entirely by the designer, who could make as beautiful objects in metal as he could in wood.

There remains only the factor of cost. Mass production will, of course, take care of a large part of this item, but it must be remembered that the woodworking industries also have modern methods. It is impossible to make any broad statements at this time as each piece manufactured would have to be attacked as a separate problem.

Granting the points of utility, convenience, beauty and cost, metal furniture should stand as good a chance as wood. The public can be educated—not overnight, of course, but step by step.

Another advantage, more academic and general in aspect but nevertheless important, is the fact that such a development would save our forests and substitute for wood, materials of which we have an abundance.

Salvaging Waste Metals

The metal trades have the peculiar distinction of including a branch which is directly in line with the trend of the times and promises to be a more and more important factor in industry. Shortly after the advent of Herbert Hoover as Secretary of Commerce, his Department took active steps to eliminate waste in industry as far as possible. It was no wonder, then, that the scrap smelting and refining industry was recognized and its importance admitted. The National Association of Waste Material Dealers, the trade association for this industry, has been working steadily to further co-operation between dealers and smelters and among themselves and the organizations with which they do business. The importance of their contacts can be judged when it is pointed out that among the people with whom they have dealings are the railroads, foundries, rolling mills and manufacturing plants.

This Association recently organized a Salvage Division which held a meeting in Wilmington, Del., on June 6th

and 7th, being guests of the du Pont Company. (See page 327 of this issue.) Part of the work of the Salvage Division will be to render assistance to producers of waste materials in classifying such material. Also, it is noteworthy that, in addition to scrap, this Division intends to take up the disposal of obsolete and inactive equipment, to build up a clearing house for the disposal of such materials and equipment and, in this way, to use up a considerable quantity of products which had formerly been scrapped or junked or had gone to waste completely.

It is more and more generally recognized by progressive organizations that their production problems consist not only of manufacturing and selling at as low a cost as possible, but also of disposing of their waste to the best possible advantage. For example, if instead of selling their turnings and borings of various alloys all mixed and jumbled a plant keeps and sells them separately, these turnings will not only bring a much higher price but will also be much more useful to those to whom they are sold. Instead of selling an old machine to the junkman, it can be sold to some organization which has need for just such a piece of equipment. It may be obsolete in one plant but very useful in another. By such transactions everybody gains.

Industry has in general acquired an understanding of the importance of proper disposal of its waste material. The public at large, in spite of some education during the war, still lacks it, but when this same public becomes familiar with the ramifications and vital importance of scrap and waste, the waste material industry will achieve a dignity which has been owing to it for much too long a time.

A Candidate of Industry

The presidential nomination of Herbert Hoover by the Republican party presents to the citizens of the United States a candidate of industry, for as is universally known, Mr. Hoover has been a mining engineer from his earliest career, in various parts of the world—thereby aiding materially in the production of metals.

He is the first engineer candidate for president since the days of George Washington. He achieved international reputation for his remarkable work during the great war as a directing force in saving his stranded countrymen in Europe and for his masterful supervision of supplying food to the starving Belgians.

When, in 1921, he was appointed Secretary of Commerce by President Harding, one of his earliest acts was to call into conference the business publications of the country, that he might have a better understanding and firmer grip on industrial conditions. For eight years he has been the pre-eminent business cabinet officer of the Coolidge administration, as Secretary Mellon has been the financial genius.

In this way the career of Herbert Hoover is a notable contradiction to that of the average political officeholder, many of whom—especially the easy promising type—might be utter failures in business or professional life.

The politician is always solicitous about the rights and welfare of "The People," especially before the election. But when voted into office his usual chief concern is how his actions will bring him the most votes, regardless of the greatest good for the greatest number. Incidentally, he manages to further his own fortunes, either by getting himself elected to an office paying a higher salary or as sometimes happens, by corrupt practices.

In Herbert Hoover, the business men of the country have a candidate, the reverse of the political type. They have a man who understands industry and business, and also the administration of national affairs.

Surely, when industry thrives all other arts and occupations prosper, whether it be education or agriculture. A man with knowledge of and sympathy for business affairs can be depended upon to aid the industry of the country, as well as to make every effort to keep business clean.

So apparent was Hoover's ability to the business press that the business papers practically united on his candidacy, and even took part in helping to secure his nomination.

Such action is a striking exception to the usual practice of industrial journals, for business papers are non-partisan and take no part in politics. The last exception that we remember to this general rule occurred in 1896, when the Trade Journals, as they were called then, opposed universally the free silver heresy as preached by Bryan.

To indicate the attitude of the business publications, we print below two letters which were written to a Brooklyn daily paper conducting a prize contest of one hundred word opinions on the various presidential candidates.

TO THE EDITOR OF THE STANDARD UNION:

I have known Mr. Hoover well for several years. Sincerity stands first among his many fine attributes.

He is my choice because:

My faith in Mr. Coolidge's honesty of purpose precludes believing that he would consent to run again.

He has pledged himself to carry out Mr. Coolidge's policies.

He is a political economist—not a politician.

He is a forceful character, quick to discern and decide; he has proved his ability as an executive in every undertaking during the last fourteen years.

He has lived up to his own slogan—"More business in government; less government in business"—and would so continue.

February 18, 1928. E. A. SIMMONS,
Publisher of the Railway Age and President of the Simmons-Boardman Publishing Company.

TO THE EDITOR OF THE STANDARD UNION:

Regarding presidential candidates:

I am for Herbert Hoover for the following reasons:

1. His experience of eight years in the President's Cabinet makes him a national asset, not a local celebrity.

2. He is an international figure, having had engineering and business transactions in various countries of the world.

3. He says that he will carry out the policies of Calvin Coolidge, which have proved so beneficial to the United States and the rest of the world with whom we have constant communication.

4. In addition to all the attributes cited above, Hoover thoroughly understands the business, agricultural and financial necessities of the country. Therefore, he is preeminently fitted to grapple with all of our problems.

February 17, 1928 PALMER H. LANGDON,
Publisher of THE METAL INDUSTRY.

New Books

Light Metals and Alloys. Aluminum and Magnesium. Bureau of Standards Circular No. 346. Size, 7" x 10"; 403 pages. Obtainable from the Superintendents of Documents, Washington, D. C.; price $1.10.

The problem of supplying technical men with systematic, sufficiently complete and still brief enough information on some special topics becomes more and more complicated. Research is going on all the time, industrial records which were hidden for a long time in the secret files of various companies, penetrate the current literature in an ever growing stream. Under these conditions, barely a few lines of technical knowledge exist which appeal to circles sufficiently large to warrant the private publisher in undertaking to have revised and enlarged editions of the same treatise every year, or even every second year. As a consequence, books treating a certain metal like aluminum, copper, nickel, etc., though very important for the persons interested, become obsolete almost before they are published. Again, such books are of necessity very expensive.

It has been for years the opinion of the author that the publication of books treating such subjects as are important industrially but limited as to the scope of the possible readers, must become concentrated in the hands of the national government. The facts have borne out this opinion. Three circulars, one dealing with aluminum, another with copper and the third with nickel, were published by the U. S. Bureau of Standards during the last decade. True enough, the first three publications or circulars were rather colorless and lean in important matter; still a start has been made and now we see the coming of the circular No. 346 of the Bureau of Standards, which describes the properties of aluminum and magnesium together with their various alloys in a very systematic way. Fully four hundred and three pages are devoted to the subject and the whole circular which looks much more like a good sized volume can be had for the price of $1.10.

There is hardly anything that might be criticized in the new circular. Miss M. G. Lorenz of the Bureau of Standards Staff succeeded in turning out a most carefully made compilation which treats the subject in the most impersonal and conscientious way.

It is unnecessary to give a list of the various parts and paragraphs of the book. The distribution of the subject follows perfectly logical lines and consequently every reader may expect to find the necessary information just at the point where it should be put.

There is only one feature which should be criticized and even this one can hardly be blamed upon the oversight of either Miss Lorenz or such persons as helped her with her work. This is the lack of a sufficient number of photomicrographs which will make it necessary for the reader to obtain, in addition, other books or magazines on the same subjects. It certainly might have been better if the Bureau of Standards had charged $2.00 for a book of this kind adding to it about one-third of its own value of photomicrographic matter.

I hope that the Bureau of Standards will publish analogous books on every phase of metallurgy, excluding the strictly theoretical and general manuscripts. This certainly will eliminate at least a part of the incongruity of the present-day technical literature which expresses itself in efforts to publish books commercially where profits are excluded by the very nature of the subjects.—M. G. Corson.

The Abrasive Handbook. By Fred B. Jacobs. Published by The Penton Publishing Company, Cleveland, Ohio. Size, 6x9; 547 pages; price, $5.00.

A complete reference work on abrasives and grinding practice has been compiled by Mr. Jacobs, who has written much in the past on this subject, including works on design of abrasive equipment, methods of cam production, regrinding of machine parts, and similar material. The work just published is intended primarily for the engineer, manager or superintendent of grinding plants as well as for the foreman and the grinder himself. It contains in very compact form a mass of information which is invaluable to those whose work it is to grind metals, and the book should be welcomed by them. It covers every division of the field: materials, methods, equipment, safe operation of wheels, polishing and buffing, and other factors.

Yearbook of the American Bureau of Metal Statistics, 1927. Published by the American Bureau Metal Statistics, New York. Size, 8¼ x 10½; 112 pages.

This is the most complete and authoritative set of non-ferrous metal statistics available. It covers production, consumption, shipments, exports and imports, and other figures on all non-ferrous metals used in fair quantity. All countries are reported upon as far as possible, and for most of the world the figures are complete. Where approximations have been resorted to, this is stated, so that there can be no error on this account. The book has been published for eight years now and is highly valued by users of statistics on metals.

Government Publications

Publications listed hereunder are obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C, at the prices given, unless otherwise noted.

Bibliography on Foreman Training. A selected and annotated list of references on recent books, pamphlets and magazines; prepared by the Federal Board for Vocational Training as Bulletin No. 35, Trade and Industrial Series. One copy free to individuals on request, other copies 10 cents each.

Standard Samples Issued or in Preparation. Supplement to Circular No. 25 of the Bureau of Standards, Department of Commerce.

Correspondence and Discussion

Enamel for Conduit Coating

To the Editor of The Metal Industry:

We wish to acknowledge your letter of April 4th, giving us the formula for enamel to be used in coating conduit.

We appreciate receiving this information, as we are doing considerable research work along this line, and it will materially help us. We wish to thank you for your prompt attention.

TRIANGLE CONDUIT COMPANY, INC.,
Brooklyn, N. Y., April 5, 1928. By John E. Wells, Chief Engineer.

Platers' Wrinkles Indispensable

To the Editor of The Metal Industry:

I am enclosing remittance of 20 cents for which please send me two copies of Platers' Wrinkles. I have lost my copy and find the information contained in this booklet almost indispensable in my metal finishing operations.

La Grange, Ill., June 7, 1928. MORRIS BROWN.

French Gray Finish

To the Editor of The Metal Industry:

In reference to Problem 3,748, entitled French Gray Finish, which appeared in your May, 1928, issue, I wish to state that I have turned out thousands of pieces with that kind of finish, for trunk hardware. Some were brass plated and some were cast brass. The following solution gave me good results:

Water	5 gallons
Hyposulphite of soda	6 lbs.
Sugar of lead	2 lbs.

Either a deep black or a gray can be produced with such a solution, the change from gray to black necessitating only a manipulation of the proportions and the temperature in working. As with any other oxidized finish, this finish should be coated with a good grade of lacquer.

Coldwater, Mich., May 16, 1928. A. V. RF.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical; WILLIAM J. PETTIS, Rolling Mill; W. J. REARDON, Foundry; P. W. BLAIR, Mechanical; CHARLES H. PROCTOR, Plating Chemical

Black Finish on Steel

Q.—Can you give me the formula of a solution to put a jet black dull finish on iron, steel or copper that will be quite permanent without the use of lacquer as a protective coating? I do not seem to obtain the finish I want from black nickel solutions.

A.—You will be unable to produce a jet black dull finish on iron, steel or copper that will be permanent without either lacquering or applying a thin coat of wax such as Johnson's floor wax. The black nickel solution given on page 20 of PLATERS' WRINKLES should be suitable for your purpose. However, it is necessary to sand blast the metal surface first, then coat lightly with nickel before black nickel plating if you want a dull finish.

The following method will produce a rust proof finish on iron, steel or copper which will stand a salt spray test for 500 hours.

Cleanse the articles as usual. Zinc plate in the following solution:

Water	1 gallon
Zinc cyanide	4 ozs.
Sodium cyanide	4 ozs.
Caustic potash	3 ozs.
Anodes, pure zinc; temperature	112° F.

Zinc plate for 10 minutes at 5 volts, then wash the articles thoroughly. Next, immerse them in an oxidizing dip composed as follows:

Water	1 gallon
Caustic soda	4 ozs.
White antimony oxide	¼ oz.

Zinc plated surface will turn black after a moment; then remove, wash and dry out. Next, apply a thin coat of 2 parts black lacquer to 3 parts thinner by spraying, and then dry articles thoroughly by heat. The resulting finish will be dead black and rust proof. C. H. P., Problem 3,762.

Bright Nickel Solution

Q.—Please give a formula for a still solution for bright nickel plating. I have been polishing, buffing and plating for 30 years but new developments are always coming out and I wonder what you consider the best bright nickel solution now.

I would like to have a copy of your PLATERS' WRINKLES. What is a good book giving modern plating methods in simple language?

A.—We have advocated the bright nickel solution below for the past few years. It has been giving good results. The brightening agent or factor is cadmium chloride, which should never be added in amounts more than one-half ounce per hundred gallons of solution at any one time. The best method of adding it is to mix one pint of hot water, one-half ounce cadmium chloride and four ounces of muriatic acid and add this to 100 gallons of solution. The formula for the whole solution is as follows:

Water	1 gallon
Single nickel salts	12 ozs.
Nickel chloride	1 oz.
Sal ammoniac	1 oz.
Boracic acid	1½ ozs.
Cadmium chloride	1 grain
Muriatic acid	⅛ oz.

You can use the brightener as mentioned in the first paragraph instead of the one gram of cadmium chloride and muriatic acid as stated in the formula. If it is used, put in 5 drops of it in place of the gram of cadmium chloride and the ⅛ oz. of muriatic acid.

PLATERS' WRINKLES will give you a considerable amount of plating data. The latest works on plating are "Principles of Electroplating and Electroforming," by Blum and Hagaboom, and "Electrodeposition of Metals," by Langbein and Brannt.—C. H. P., Problem 3,763.

Copper Plating Steel

Q.—We have been referred to you as a possible source of information on copper plating. We desire to know how to copper plate steel strips ⅛ in. thick, 1½ in. wide and 10 in. long with about .002 in. deposit. We would also like to know if it is possible to copper plate cast iron.

A.—Your work will require a complete electroplating unit, including a plating generator giving 6 volts and a minimum of 1,000 volts. The current capacity, however, is determined by the amount of work to be done at one time, the amperage applied being in proportion to the total work surface area. You will also need a tank of dimensions suitable for holding your work in the amounts you desire to plate at one time. The strips are immersed by laying them upon racks standing in the tank.

The tank should be heated with iron steam coils. The tank equipment consists of anodes and cathodes; copper rods one inch or more in diameter, with connections for current. There should be main copper conductors leading from the generator to the plating tank.

You will also require a steel tank for alkaline cleansing of steel strips. This should also be equipped with steam heating coils. Pickling tanks are needed for removal of fire scale and other tanks for water washing, etc. All equipment can be obtained from plating equipment firms advertising in THE METAL INDUSTRY; see Buyers' Guide at back of book.

The solution for copper plating is composed as follows:

Water	1 gallon
Sodium cyanide, 96-98%	6 ozs.
Copper cyanide, 70%	4½ ozs.
Bisulphite of soda	1½ ozs.
Caustic soda	½ oz.
Hyposulphite of soda	1/64 oz.

Apply 5 to 6 volts and whatever amperage is needed to produce a satisfactory deposit. Heat the solution to a temperature of 110° F. To prepare the solution, dissolve the sodium and copper cyanide in one-third of all the water to be used in preparing a given number of gallons of solution. (The formula above is for one gallon.) Then add the balance of the water and then, in the order given, the bisulphite of soda, caustic soda and hyposulphite of soda. Stir the solution thoroughly and it is ready for use.

Have meters for voltage and amperage so that the current can be determined. Use a rheostat of 500 ampere capacity. Voltage, amperage and length of time plating is done determines the thickness of the deposit. Experimentally, you can use a 6 volt, 100 ampere storage battery, which should be constantly charged with a battery charger from a direct current lighting circuit.

For a complete study of electroplating methods, purchase "Electro-Deposition of Metals," 8th edition, by Langbein and Brannt, or, "Electro-Plating and Electro-Forming," by Blum and Hogaboom. We can obtain either of these books for you.

In reference to your final question, we can state that cast iron may readily be plated in the copper solution we have given you here. However, cast iron must be very carefully cleansed and free from any burnt in sand or surface oxidation. This can be accomplished by regular pickling and alkaline cleaning methods. Follow the same procedure as in copper plating steel.—C. H. P., Problem 3,764.

Copper Solution Additions

Q.—In copper plating I am using this formula:—copper carbonate, 8 ozs.; sodium cyanide, 16 ozs.; carbonate of soda, 2 ozs.; water, 1 gallon. After plating I brush and buff it, but the plate does not hold. The hydrometer reading of my solution is about 8, and I plate at a temperature of 80° F. What can I do to make the plate stay on?

A.—To overcome your problem, add 1½ ozs. of bisulplate of soda to each gallon of solution, then ½ oz. of caustic soda. Stir the salts thoroughly into the solution. If the copper deposit is too dark use as a brightener an addition of 2 ozs. hyposulphite of soda per 100 gallons of solution. If after these additions the copper deposit is the proper color and does not rub off, add ⅛ to ¼ oz. of sodium cyanide to each gallon of solution every day you work the solution. This will maintain anode reduction.

If, however, the anodes cost over excessively after making the additions here outlined, you may have to add 1 oz. of sodium cyanide per gallon of copper solution as free cyanide, to keep the anodes cleaner.—C. H. P., Problem 3,765.

Lead on Battery Connections

Q.—What formula or process can you suggest for lead plating battery connections to obtain a fairly thick coating of lead? The solution now being used is lead carbonate in connection with hydrofluoric acid and boric acid, but the result is only a light coating taking considerable time to produce.

A.—The formula you are using is recommended by the United States Bureau of Standards and should give good results. We presume that your difficulty is due to the fact that your solution is either too radically acid, which prevents a normal deposit because of very high hydrogen evolution at the cathode, or the solution is deficient in free acid and the current consumption and consequent lead deposition are too low. We suggest that you test out a ten-gallon solution. First add one or two ounces more of hydrofluoric acid per gallon of solution and one-half to one ounce of New Orleans black molasses. If, on the other hand, you find that the solution is too acid, add one to two ounces of soda ash and one-half to one ounce of the molasses per gallon.

All steel parts should be coated with lead in a hot alkaline solution for a few minutes then plated in the acid lead solution. For trial you can prepare an alkaline solution as follows:

Water	1 gallon
Caustic soda, 76%	24 ozs.
Lead acetate (crystallized)	8 ozs.
Powdered yellow rosin	¼ oz.

Temperature, 180° F.; voltage, 1½ to 2½; anodes, sheet lead. —C. H. P., Problem 3,766.

Peeling Nickel Plate

Q.—We have been nickel plating German silver plates for some time; lately we have been having trouble with peeling. We scrub the plates with a strong lye solution and then clean them off with lime before plating; advise us if lime is all right for cleaning. What can be added to the nickel solution to prevent the peeling?

A.—You might mix a little sodium cyanide with the water and lime mixture, about 4 ozs. sodium cyanide per quart of water. The cyanide will remove any oxidation and the lime will do the cleaning. If you find afterwards that the nickel deposit has still a tendency to peel in spots, hydrogen is the probable cause. Add sodium perborate to the nickel solution to neutralize the hydrogen gas. Twelve ounces dissolved in one gallon of warm water, to which is added twelve ounces of muriatic acid, will be ample for one hundred gallons of nickel solution. Make the addition at the close of the day's work; stir the sodium perborate thoroughly into the nickel solution.—C. H. P., Problem 3,767.

Plating Baby Shoes

Q.—We have a lot of baby shoes to silver plate. Having had no experience in this kind of work, we would like you to give us the method.

A.—The simplest and best method for you to pursue in silver plating (baby shoes) would be to copper plate first, as follows:

Coat the shoes over with two thin coats of asphaltum varnish which should be thinned down with pure turpentine. The varnish is best applied with a spray. Be sure that all parts of the shoes are uniformly covered.

Let the varnish so applied dry somewhat until it becomes tacky, then completely cover the varnish coat with very fine copper bronze powder known as platers' copper bronze powder. Rub or brush the copper bronze thoroughly into the varnish so that all parts are covered, then let the coating dry thoroughly and finally brush off all powder that was applied in excess.

Rinse the shoes in water, then immerse them in a silver dip so that the copper bronze perceptibly whitens. Just a little of the ordinary silver solution in water, quite dilute, will do. Then rewash in water and copper plate in the following solution:

Water	1 gallon
Copper sulphate	1¾ lbs.
Sulphuric acid	4 ozs.
Yellow Dextrine	¼ oz.

Temperature of solution should be 80° Fahrenheit; voltage 1 to 2; amperage as found advisable. Avoid burning. Use soft sheet copper anodes. A very slight air agitation of the copper solution is advisable The motion prevents burning. Wire up the shoes with soft copper before plating; make several points of contact. Copper plate for several hours, then remove and either acid bright dip or scratch-brush buff to a lustre finish if desirable. Then plate under normal silver or gold plating methods and conditions to produce the final finish desired.

We have given ashpaltum varnish as the base for the copper bronze because ashpaltum will render the leather waterproof. You can use ordinary alcoholic shellac varnish also. Apply two or three coats by spraying when dry, then spray on a copper bronze lacquer—1 pound of copper bronze to 1 gallon or ordinary celluloid lacquer, or the amount of bronze powder that will give the best results. Then proceed as previously outlined.—C. H. P., Problem 3,768.

Replenishing Solutions

Q.—I would like information regarding plating solutions. If a solution is in good working order but getting low in the tank, should it be made up of the contents in proportion? Should I use all the ingredients as in making a new nickel solution?

A.—We presume you refer to a nickel solution, but the suggestions we make are true for any plating solution. Always keep the original solution line in the plating tank by additions of clean cold water every day, preferably at the close of each day's work. In a nickel solution, add 1/32 oz. of pure muriatic acid to each gallon of solution, or 3 ozs. per 100 gallons. The acid addition helps to maintain anode reduction, which means nickel in the solution. When it is necessary to add salts of nickel, which can be determined by the Baume hydrometer, then add sufficient quantities as may be required to the solution, based upon the following:

Boiling water, as little as possible, to dissolve the salts.

Per gallon of solution:

Single nickel salts	1 oz.
Sal-ammoniac	¼ oz.
Boracic acid	⅛ oz.

For copper or brass solutions, maintain the solution line in the tank as outlined, then add from ¼ to ¼ oz. sodium cyanide per gallon of solution per day, when the solution is in constant operation. When metal is required, add sodium cyanide and copper cyanide equivalent to 1 oz. each per gallon of solution, dissolved in hot water as outlined for nickel solution.

Zinc should always be added to the solution in small proportions, not more than ⅛ oz. of zinc cyanide and the same amount of sodium cyanide per gallon of solution. The latter addition refers to a brass solution only.—C. H. P., Problem 3,769.

Stripping Silver from Brass

Q.—Please tell us how to strip silver plate from brass.

A.—You can strip silver from brass electrolytically in a solution of 9 parts sulphuric acid and one part water by measure. To every gallon of acid and water add one ounce of glycerine and mix thoroughly into the solution. The articles to be stripped are used as the anodes. For cathodes use sheet lead or copper, plating at 4 to 6 volts.

Silver can also be stripped from brass by immersion in the following acid strip solution:

Sulphuric acid	4 Parts
Nitric acid	1 part

If the silver is not reduced fast enough in this strip solution, add 1 to 2 ozs. of water per gallon of mixed acids. However, you must avoid an excess of water in the acid strip as this produces a rough surface on the brass.—C. H. P., Problem 3,770.

Patents

A REVIEW OF CURRENT PATENTS OF INTEREST

1,662,865. March 20, 1928. **Method of Coating Metal Articles.** John W. Powell, Martins Ferry, Ohio. The method of providing a metal article with a permanent closely adherent gold-bronze finish, comprising applying to the article first a coating of a mixture of lacquer and gold-bronze and then a plurality of coatings of a mixture of Chinawood oil and gold-bronze, and baking the article after the application of each of said coatings.

1,663,037. March 20, 1928. **Method of Galvanizing.** Jasper Blackburn, Webster Groves, and Arthur Albrecht, St. Louis, Mo.; said Arthur Albrecht assignor to said Jasper Blackburn. The method of galvanizing which comprises first making a bundle of a number of articles to be treated, second pickling said bundle, third dipping said bundle into a bath of molten metal fourth removing said bundle from said bath and simultaneously therewith subjecting the same to a flame for increasing its temperature, fifth jarring said articles so as to separate the same from each other, sixth passing said bundles through oil and into water by a continuous movement for cooling and setting the metal adhering to the articles.

1,663,141. March 20, 1928. **Soldering Material.** Samuel Ruben, New York, N. Y. A solder compound of substantially lead 34%, tin 34%, zinc 31% and magnesium 1%.

1,663,150. March 20, 1928. **Aluminum-Base Alloy.** Robert S. Archer, Cleveland, Ohio, assignor to Aluminum Company of America, a Corporation of Pennsylvania. An aluminum base alloy containing from about 3 to 15 per cent silicon with more than about 0.8 per cent iron, and more than about 0.05 per cent of a metal of the sixth group of the periodic system having an atomic weight less than 190.

1,663,215. March 20, 1928. **Zinc-Base Alloy.** Willis McGerald Pierce and Edmund Arnold Anderson, Palmerton, Pa., assignors to The New Jersey Zinc Company, New York. A zinc base alloy containing 1 to 15% aluminum, 0.5 to 4% copper, 0.05% magnesium and 0.01 to 0.5% nickel.

1,663,446. March 20, 1928. **Metal-Cleaning Solution.** Clarence F. Dinley, Detroit, Mich., assignor to Rex Products & Manufacturing Company, Detroit, Mich. A composition for the preparation of metallic surfaces for subsequent coatings, including a dilute etching acid, a soluble metallic salt, an acid of the tannin group, and an oil solvent.

1,664,300. March 27, 1928. **Process of Silvering and Beveling Small Mirrors.** Bert F. Kelly, Indianapolis, Ind., assignor to Parts Corporation, Indianapolis, Ind. The process of beveling a glass plate consisting in providing a cup wheel having an inverted V-shaped cutting edge, mounting the glass on a carriage at a predetermined angle to the cutting edge of said wheel and gradually moving said glass in one direction while in engagement with one side of said edge for causing said edge to cut a flat bevel on said glass during one passage of the glass.

16,922. April 3, 1928. **Tinning Pot.** John J. Markey, Washington, Pa. A tinning pot comprising a plate bendable under heat and shaped to form the bottom, front, and rear walls of said tank; stepped end plates connected to said plate to form the end walls of said tank; a partition connecting said end plates between said walls to divide the tank into two chambers extending from the bottom of the tank and one deeper than the other.

1,664,428. April 3, 1928. **Pickling Machine.** Constantine G. Miller and Charles F. Cleveland, Chicago, Ill. assignors to The **Meaker Co.**, a Corporation of Illinois. In an automatic pickling machine of the class described, the combination with a framework, article carrying means movably mounted thereon, mechanisms for operating said article carrying means, a stationary platform positioned to permit said article carrying means to pass therethrough to permit articles thereon to be deposited on said platform, and rotatable means operating through said platform adapted to discharge the articles therefrom.

1,664,750. April 3, 1928. **Process for the Production of Galvanic Metal Coatings.** Felix Kirschner, Vienna, Austria. The herein described method of producing a highly lustrous metallic coating upon a metal base, which consists in electrolytically coating the ground metal with a layer of low-melting-point metal, fusing the layer to the ground metal and thereupon cooling it in a water solution to transform it into a layer having a smooth highly lustrous surface, and immediately electrolytically depositing nickel thereupon.

1,665,062. April 3, 1928. **Mold for Making Metal Patterns by Electrodeposition.** Arthur K. Laukel, Detroit, Mich. As a new article of manufacture, a mold for receiving electrodeposited metal in an acid electrolyte, said mold being constructed of substantially carbonate-free plaster of Paris.

1,667,212. April 24, 1928. **Enamel for Coating Cans.** Roger H. Lueck, Oak Park, Ill., assignor, by mesne assignments, to the Public of the United States of America. An enamel for coating cans which are to contain food products, consisting of a substantially neutral oleo-resin varnish substantially free from lead and having incorporated therein an insoluble metallic compound of such metal or metals forming sulphides which are not dark colored.

1,667,387. April 24, 1928. **Metal-Drawing Apparatus.** Delamar C. Kinnear, Waterbury, Conn., assignor, by mesne assignments, to The American Brass Company, Waterbury, Conn. A drawing apparatus comprising a clamp, an open-sided die holder, means for moving said die holder away from said clamp, in combination with a split die the two parts of whch have extensions adapted to enter said die holder, a carrier to which said parts are pivoted, and means carried by said die holder along which said carrier is slidable forward and from said die holder.

1,667,515. April 24, 1928. **Plating Apparatus.** Fred P. Green, St. Louis, Mo., assignor to The Lustre Co., St. Louis, Mo. In a plating apparatus, a tank for electrolytic solution, means for supporting anodes in the solution in the tank, a rock shaft, a pair of arms attached to said rock shaft above the level of the solution in the tank, rods supported by said arms at opposite sides of said shaft for supporting the work, and means for rocking said shaft and said arms to raise and lower the work in the solution substantially the same distance from the anodes.

1,667,641. April 24, 1928. **Bearing Alloy.** Irving R. Valentine, Erie, Pa., assignor to General Electric Company, a Corporation of New York. A bearing alloy comprising about 70 parts copper, a hardening metal, about 25 parts lead, and a fractional part of arsenic.

1,667,787. May 1, 1928. **Method of Applying a Plating of Aluminum to Iron and Steel Sheets and Bands.** Oliver Jaeger and Ernst Lueth, Trier im Rheinland, Germany, assignor to Trierer Walzwerk Aktiengesellschaft, Trier im Rheinland, Germany. A method of applying a plating of aluminum to iron bands, consisting in making an iron band and a band of an aluminum alloy metallically clean and roughening the same, passing the said bands together first through the rolls of a cold rolling mill, causing the same to combine only through the pressure of the cold rolling mill and converting them into a thin multiple metal strip by repeated rolling without the application of heat, as set forth.

1,667,966. May 1, 1988. **Alloy.** Michael G. Gorson, Jackson Heights, N. Y., assignor to Electro Metallurgical Company, a Corporation of West Virginia. A bronze containing a substantial quantity of aluminum not greater than about 9%; more than 0.5% of chromium in solid solution, and sufficient nickel to hold the chromium in solution.

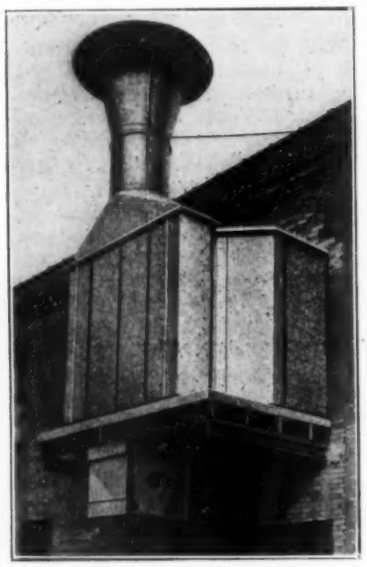
1,668,306. May 1, 1928. **Refractory Material and Process of Producing the Same.** Joseph G. Donaldson and Henry L. Coles, Hamilton, Ohio, assignors to Guardian Metals Company, Hamilton, Ohio, a Corporation of Delaware. As a new material, an alloy consisting of copper, approximately .60 to .75% silicon and less than 1% carbon.

Equipment

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

Spray Cabinets on Outside of Building

The Grand Rapids Blow Pipe and Dust Arrester Company, Grand Rapids, Mich., has developed a method of installing the Newcomb syphon ventilated spray cabinet on the exterior wall of finishing rooms. Such installation is said to have several major advantages over interior installation, namely, space-saving, lessening of fire hazard, and elimination of the customary stack.



SPRAY CABINET ATTACHED TO EXTERIOR OF BUILDING

The spray cabinet is attached to the side of the building, usually just outside of the finishing room. Only the weather top is used, as a rule, the cabinet generally being placed near the top of the building. It is stated that while the Newcomb cabinet has always been so constructed as to make it even less fire-hazardous than the regulations demand, the installation on the outside lessens the danger of fire from anything related to the spraying process, as well as safeguarding the health of the operators. It is stated that the cabinets can be placed on buildings either singly or in batteries, according to requirements.

Refractory for Furnace Lining

The Alpha-Lux Company, Inc., 192 Front Street, New York City, is manufacturing a high grade refractory material for making one-piece furnace linings. The company claims the following advantages for its product, which is known as "Luxit": Resistance to high temperatures, slag reaction, alkaline vapors and fusible alkalies; the properties of plasticity, binding and solidity; and the proper chemical composition to give high heat resistance as well as durability. Its fusion point is stated to be 3,300° F. (SC 38), and it is free from iron and lime. The material is prepared by mixing with water 24 hours before application and rammed in between furnace shell and a pattern designed to allow the necessary wall thickness. It is dried by heating with a wood fire. Luxit is said to be suitable for patching cracks or holes in furnace linings and also for jointing of furnace bricks.

Course in Porcelain Enameling

Those who are interested in porcelain enameling will have an opportunity of taking a complete course on this subject, whch is to be given during the weeks of July 9th to July 23rd in Cleveland, Ohio, by The Ferro Enameling Company of that city.

The course will be under the direction of J. E. Hansen, who is favorably known among the technical experts of the porcelain enameling industry, and will be studied from both the technical and practical standpoint. Some of the subjects that will come up for discussion will be, **Dry Process vs. Wet Process Enameling; Sand Blasting; Enamel Shop Management; Diagnosing Enamel Shop Troubles.** Booklet and complete information may be obtained by writing The Ferro Enameling Company, Cleveland.

Quiet D. C. Motors

Century Electric Company, St. Louis, Mo., has placed on the market a new line of direct current motors known as type DM which are said to have a number of new features giving them certain advantages. Chief of these is said to be the motor's almost noiseless operation, due to selection and fitting of brushes and reduction of magnetic noises to a minimum. Other advantages claimed are as follows:

The field is a two-pole, laminated steel structure. Field coils are wound on forms, insulated and taped to stand up well; armature slots are insulated with alternate layers of fish paper and varnished cambric; hardwood wedges are used to retain coils. Cotton-enamel wire is used for both field and armature coils, and thorough treatment with insulating paint lends resistance to dampness. Bearings are phosphor bronze castings, with machine cut, figure eight oil grooves. Century wool-yarn lubrication system is said to permit a year's continuous, 24-hour-day operation without recoiling. Commutator is made from rolled copper bars, insulated with mica, and generously proportioned to insure length of service. No adjustment is required during life of brushes, which are carried in box-type holder.

CENTURY DM D.C. MOTOR

Static and dynamic balance of all armatures aids in eliminating vibration, and the temperature rise at hottest spot is said never to exceed 40° C. The motors are built in standard sizes from ⅙ to ½ h. p., with speeds corresponding standard a. c. motors.

Combination Ladle-Nozzle

The Joseph Dixon Crucible Company, Jersey City, N. J., manufacturers of crucibles and graphite refractory products for over 100 years, have just announced a new combination ladle-nozzle.

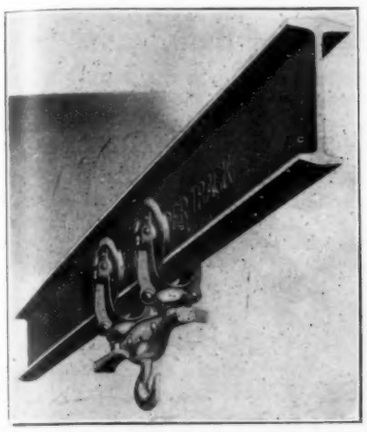
COMBINATION LADLE-NOZZLE

The upper half of this nozzle is all super-refractory clay and the lower half is graphite. The chief advantage claimed for this combination nozzle is that metal can leave the ladle at a much lower temperature than is the practice generally. This means, it is stated, that a more perfect ingot is poured, due to the heat retaining qualities of the graphite in the lower half of the nozzle.

The combination nozzle is made in any size and with flow hole to meet the requirements of the individual user, according to the makers.

New Overhead Conveyor

The Louden Machinery Company, Fairfield, Iowa, manufacturer of industrial monorail systems, has brought out a heavier line known as "Louden Super-Track." Carrying capacity is rated at 3000 lbs., which allows a large margin of safety, it is stated. This new overhead trolley track is a special section, approximately 6 inches deep, with a 3-inch flange at the top and a 2-inch flange at the bottom. Unlike ordinary I-beam it is specially rolled, both as to form and material, for service as a trolley track. Special features also distinguish the new 2-way, 3-way, cross-track and turntable switches designed for use with the super-track-system.



SUPER-TRACK CONVEYOR

The new track not only has the advantage of handling heavier loads but it eliminates, in large measure, the necessity of supporting superstructure. Hangers, also, may be widely spaced, thereby saving time and minimizing the expense of erection, the company claims.

Louden "Super-Track" will not supersede the "Monorail System" with double bead track. Instead, the "Super-Track" is an addition to their line of conveying equipment which permits them to tap a broader market. "Super-Track" may be used alone or in conjunction with the lighter Louden double bead monorail.

New Testing Sieve

The Newark Wire Cloth Company, 351-365 Verona Avenue, Newark, N. J., has developed a new testing sieve which is equipped with an ingenious improved joint. They claim it to be a vast improvement over the old type. An important advantage claimed is that the inside corner is rounded instead of sharp. In other words, the sharp corner has been eliminated. A sharp inside corner in a sieve gives trouble by filling up with material, making it hard to keep clean. It also interferes with accuracy and quick work. Another improvement is that all soldering is done on the outside and not on the inside. When the wire cloth becomes so worn as to need replacing with a new piece it can readily be done by melting the old solder off and then soldering the new piece of cloth on. This is accomplished without distorting the cloth.

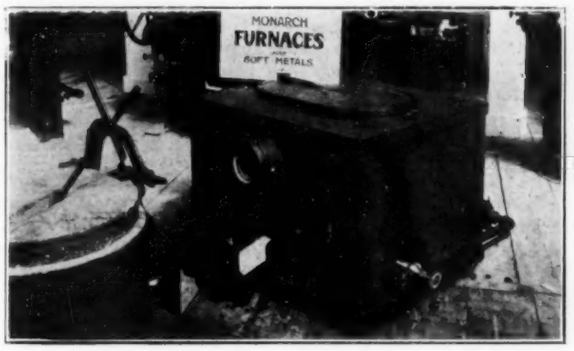
These sieves are made in 3, 5, 6, 8, 10, and 12 inch diameters and in accordance with U. S. Bureau of Standards specifications, adopted as standard by the American Society of Testing Materials in 1926.

Nickel Pellets

The Mond Nickel Company, Pittsburgh, Pa., has issued a booklet describing the production and uses of pure nickel pellets which this company produces. The purity of the pellets is stated to be 99.5 to 100%, and their uses include production of nickel steel, nickel cast iron, nickel chrome, nickel silver, ferro nickel alloys, copper nickel alloys, die casting metal, white gold and other alloys. The pellets are said to be uniform in purity and free from cobalt; made from ore mined in the company's own properties and refined by the carbonyl process based on the discovery that nickel forms a gaseous compound with carbon monoxide, known as nickel carbonyl. The process includes repeated deposition of layers of nickel over a neucleus, four to six months being required to completely form a pellet one-half inch in diameter. No melting is done in the process, the company states, making for freedom from occluded gases or other impurities which sometimes are caused by liquefying of metal. The pellets range from one-quarter to one-half inch in diameter. Among the other advantages claimed are easy handling due to pellet form which can be stored in bins and moved by gravity methods, solidity, uniformity of purity, freedom from chips or scale, and a tendency to spread uniformity in a melt.

Soft Metal Melting Furnaces

The Monarch Engineering and Manufacturing Company, Baltimore, Md., is producing a line of rectangular furnaces for melting lead, tin, zinc, babbitt, and other soft metals. These furnaces are constructed in a variety of styles for different uses, including alloying of soft metals, tinning, tempering, galvanizing, case hardening and other processes. It is stated by the maker that these furnaces are capable of maintaining temperatures accurately, being equipped with thermometers and fuel feed regulators. Either oil or gas-fired types can be supplied. Metal pots are provided in several shapes, round rectangular or oblong, in varying depths



RECTANGULAR SOFT METAL FURNACE

according to user's requirements. The furnaces are made in twelve styles and five sizes which range from 18 x 24 inches (required floor space) to 36 x 48 inches. Some of these furnaces are provided with metal pots. Another style is equipped with iron, steel or graphite pots.

Certain styles are equipped with hoods, as in the double melting and refining furnace, which uses iron pots or crucibles. Round pots with either rounded or flat bottoms can be supplied, it is stated.

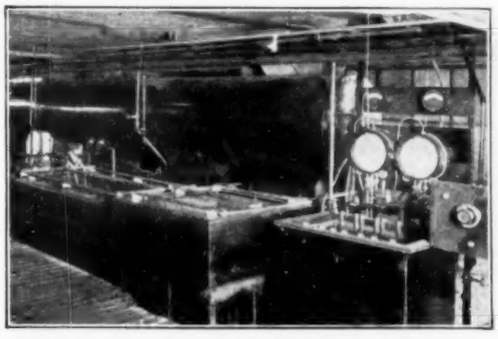
The company also has a soft metal melting furnace using either coal, oil or gas for fuel. Plain or valve pots in a variety of sizes can be supplied. This furnace is designed for use in lead pipe refining and in shot manufacture.

The illustration shows a Monarch rectangular soft metal melting furnace which was displayed at the recent foundry equipment exhibit at Philadelphia.

Exhaust System for Chromium Fumes

An interesting type of exhaust system for removing the injurious fumes from plating tanks is now being manufactured and installed by The Cleveland Blow Pipe and Manufacturing Company, Cleveland, Ohio.

A sheet metal duct surrounds the top of the tank. Around the side facing the liquid a narrow slot is cut. A certain volume of air is drawn through this slot at a definite high velocity, depending



EXHAUST SYSTEM FOR CHROMIUM PLATING

upon the size of the tank; the "suction blanket" thus formed over the tank prevents fumes from entering the room. The operator is protected, while the top of the tank is entirely unobstructed by overhead exhaust hoods. The amount of power required to run the exhaust fan is stated to be very small.

The latest of these installations is now being used in a large automotive plating plant in Ohio for the purpose of removing the fumes from chromium plating. Complete removal is essential, for the fumes are dangerous to the operator. This fume removal system is applicable also to other similar fume removal problems.

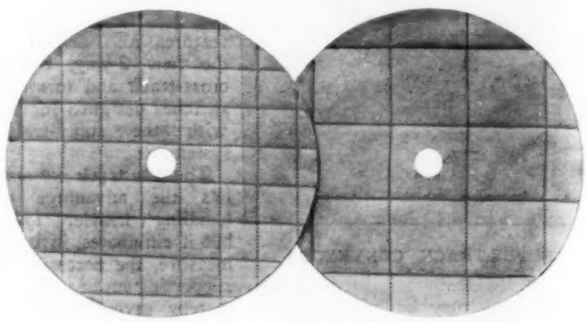
Generators for Chromium Plating

Charles J. Bogue Electric Company, 132-138 King Street, New York, for the past thirty-five years manufacturers of electric generating equipment for electroplaters, electrotypers, battery chargers and other users, is making a specialty of a line of small, low-voltage, ball bearing motor-generator sets ranging from 300 to 1000 amperes, with motors from 15 to 20 h. p., which are intended chiefly for use in chromium plating plants. However, the company states that these generators are suitable, within their output limits, wherever low-speed equipment is desired. The motor-generators are built in the Bogue plant, which is under the direct supervision of Charles J. Bogue, president, and Charles B. Little, treasurer and engineer in charge of design and construction. The generators have certain features which the Bogue company states are advantages of importance. Chief among these are low-speed operation making for greater utility and minimized wear on operating parts; generous proportions of all operating parts; high conductivity copper terminals; hard-drawn copper wherever parts are subjected to friction, including brush studs. It is stated that generators built in this manner require the least attention and can be depended upon to provide steady 24-hour-per-day operation throughout the year. The motors are similarly built for long utility, with all working parts made large, to withstand long use. All bearings are of phosphor bronze, cast and machined, with cut-in oil grooves for lubrication, it is stated.

The Bogue company, according to Mr. Little, has built generators and switchboards for generator control for a great many electroplating and electrotyping plants throughout the country, and has sent equipment to a number of foreign countries, including Australia and several European countries. The company is constantly attentive to all new developments in motor-generator construction and keeps its production in line with best practices. It builds its products for specific uses, usually to order. During its long career it has had to move several times to obtain better manufacturing facilities. A complete electrical machine shop is maintained where all its machining is done, and all apparatus constructed. Castings are purchased outside.

New Type of Buff

A new type of buff has been placed on the market by the Yerges Manufacturing Company, Fremont, Ohio. The outstanding feature of the new Yerges buff is the direction of the stitching. It is stitched at right angles both ways across the buff instead of around the buff in spirals. A large saving in the cost of



CROSS-STITCHED BUFFS

operation is said to have resulted from this simple change. The following advantages are claimed for this product:

First, the cross stitching prevents raveling and gives the buff longer life; it never presents a sewed surface to the work, but, due to the fact that only the ends of the stitching come out to the edge, the buff forms a uniformly soft, pliable face, eliminating the need of raking, which is the greatest cause of wear; pockets automatically form between the ends of the stitching to hold the abrasive. In actual practice these features are said to save from 15 to 60 per cent of the amount of abrasive required, depending upon the character of the work.

The standard spacing varies from one-fourth inch to four inches, providing buffs adapted for any kind of work, from the fastest and hardest cutting to the softest color buffing. They are also furnished with any special spacing.

Equipment and Supply Catalogs

Extruded Shapes. Taunton-New Bedford Copper Company, Taunton, Mass.

Lubrication for Safety and Economy. E. F. Houghton and Company, Philadelphia, Pa.

Interlock Steel Shelving. Interlock Metal Units, Inc., 31 East 27th Street, New York.

Paasche Spraying Equipment. Paasche Airbrush Company, 1909 Diversey Parkway, Chicago, Ill.

Bristol's Counters. The Bristol Company, Waterbury, Conn. Counting devices for various uses.

Gunite, the Graphite Steel. The Gunite Corporation, Rockford, Ill. Development of a new steel alloy.

U. S. Navy Specifications for Non-ferrous Alloys. Niagara Falls Smelting and Refining Corporation, Buffalo, N. Y.

Fuel Engineering. Mechanical Engineering Department, Towne Scientific School, University of Pennsylvania, Philadelphia, Pa.

Flattening Machines. The Torrington Manufacturing Company, Torrington, Conn. Straighteners, levellers, etc., for strip and sheet metal.

Arc Welding Equipment. The Lincoln Electric Company, Cleveland, O. Covers variable-voltage, single operator vs. constant potential, multiple operator equipment.

Lopulco Unit System for Burning Pulverized Fuel. Combustion Engineering Corporation, New York. Covers various types of horizontal, vertical and tangential burners; illustrated. Other publications of this company: Traveling Grate Stokers; Forced Draft Chain Grates.

How to Get a Good Foundry. David Lupton's Sons Company, Philadelphia, Pa. Covers daylighting and ventilation by application of Pond roof design and continuous windows.

General Electric Company, Schenectady, N. Y., publications: Crane Hoist Motors; Drum Type Switches; Portable Oil-Testing Sets; Shoe-type Solenoid Brakes; Reciprocating Air Compressors; Pot-type Electric Furnaces for Cyanide Hardening; Drum Controllers; Type R Steam Turbines; Mechanical Drive Turbines; Factory-Built Complete Industrial and Small-Plant Switchboards; Control Circuit Switches; Squirrel-Cage Induction Motors; Travel Carriage for Automatic Arc Welders; Direct Current Mill Motors; Sheath Wire Resistor Units.

Drum-Type Controllers; Drum Controllers; Gas Engine Driven Electric Arc Welder; Temperature Overload Relay Panels; Low-Speed Synchronous Generators; Constant-Potential Arc Welding Sets; Centrifugal Air Compressors, Geared Units; Multi-Speed Induction Motors; Arc Welder, Belt, Motor or Gas Engine Driven; Mechanical Drive Turbines; Remote-Indicating Speed Controller; Totally Enclosed Fan-Cooled Induction Motors; Atomic Hydrogen Arc Welding Equipment; Enclosed Speed-Regulating Rheostats

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

New York Branch, American Electroplaters' Society

HEADQUARTERS, CARE OF R. J. LIGUORI, 127 VANDERBILT AVENUE, BROOKLYN, N. Y.

SPECIAL MEETING HELD

There was a special meeting of the Branch on June 8, at 611 World Building, Park Row, New York, when the newly elected Branch officers were installed.

The speaker of the evening was Oliver Sizelove, of the Newark Branch, who presented an informative paper on Chromium Experiments, outlining a number of highly interesting developments.

Mining and Metallurgical Engineers

HEADQUARTERS, 29 WEST 39TH STREET, NEW YORK CITY

NEW YORK SECTION MEETS

R. S. Archare, chief metallurgist, Aluminum Company of America, was the principal speaker at a meeting held on June 5, in the auditorium of the Engineering Societies Building, New York City. His address was of a general nature, being a description of the history and operation of the aluminum industry. The technical phases of the subject were kept in the background for the benefit of the ladies, who were special guests at this meeting.

Mr. Archer's talk was extremely interesting, however, being concise and highly informative. He touched upon the consumer's interests in aluminum as well as upon the producer's part, explaining the different alloys and their uses. His talk was well illustrated with lantern slides showing various products as well as a few charts indicating the properties of various alloys. He spoke of the production of such articles as castings, forgings, and stamped and rolled products, including aluminum foil, which is becoming an important aluminum product. A simple testing mechanism was displayed and operated to show the relations in resilience between various aluminum alloys and steel. This property was shown to be highly important where aluminum is used in the manufacture of aircraft and other structures requiring lightness and strength.

American Welding Society

HEADQUARTERS, 29 WEST 39TH STREET, NEW YORK CITY

FALL MEETING IN OCTOBER

The 1928 Fall Meeting of the American Welding Society in Philadelphia, October 8th to 12th, promises to set a new record for successful accomplishments. As in the past few years, one of the outstanding features will be the exposition. It is expected that the exhibit, which is held in cooperation with the American Society for Steel Treating, will attract a gathering of over 75,000 people. The exhibit will occupy all the floor space of the Exposition Hall of the Commercial Museum. Five days will be devoted to displaying welding equipment and supplies, and exhibits of welded products will be an attractive addition.

Technical meetings and registration will be held at the Bellevue-Stratford Hotel in the mornings and at the Exhibition Hall in the afternoon of each day. The Meetings and Papers Committee is preparing an unusually strong program of interesting papers containing new information and findings.

A list of the companies to whom space has already been assigned includes:

Air Reduction Sales Company, American Brass Company, American Steel and Wire Company, Bastian Blessing Company, Fusion Electric Welding Corporation, General Electric Company, Gibb Welding Machine Company, K-G Welding and Cutting Company, Lincoln Electric Company, Linde Air Products Company, Metal and Thermit Corporation, Page Steel and Wire Company, John A. Roebling's Sons Company, R. D. Thomas and Company, Torchweld Equipment Company, Transportation Equipment Company, Una Welding and Bonding Company, Welding Engineer, Westinghouse Electric and Manufacturing Company, Wilson Welder and Metals Company.

Waste Material Dealers

HEADQUARTERS, TIMES BUILDING, NEW YORK CITY

SALVAGE MEETING AND CONFERENCE

The organization meeting of the Salvage Division of the National Association of Waste Material Dealers, Inc., and a conference in connection with same were held in Wilmington, on June 6 and 7. There were represented at the conference approximately fifty of the largest industrial and public utility corporations in the United States, some representatives coming as far as from Texas. The meetings were held in Wilmington upon invitation of the I. E. duPont company, which acted as host at the various meetings and at a dinner which was given at the duPont Biltmore Hotel. R. W. Phillips, manager of the salvage and reclamation division of the duPont company, was elected first chairman of the newly formed Salvage Division. The number in attendance, including those from the duPont Company, was close to 100.

Thursday, June 7th, was devoted to a conference, the program of the morning session being as follows: Welcome to Dye Works, by C. D. Forch, Manager; Brief Statement by Henry Lissberger, President, N. A. W. M. D.; Election of Permanent Chairman of Salvage Division; Brief Statement by R. W. Phillips, Chairman of the Salvage Division; Statement by Charles M. Haskins, Secretary, N. A. W. M. D.; "The Relation of the Dealer in the Waste Material Industry to the Producer and the Consumer," by Harry R. DeGroat, of A. M. Wood and Company; "The Seller's Obligation to Secure No More Than a Fair Price for Scrap," by G. H. Bangs, of the Western Electric Company; "The Relationship Between the Business and the Technical Phases of Salvage and Its Disposal," by Thomas A. Wright, of Lucius Pitkin, Inc.; "Disposition of Obsolete Buildings and Entire Plants," by R. W. Phillips, of E. I. duPont de Nemours and Company; "To What Extent Can a Credit Department Protect the Seller of Waste Materials, Surplus Supplies and Obsolete or Inactive Equipment?" by C. H. Steele, of the Eastman Kodak Company; "How the War Department Handled Its Salvage Operations During the World War," by Louis Birkenstein, formerly in charge of Salvage Branch of the Reclamation Division, U. S. Government; Informal Discussion.

The program of the afternoon session was as follows: "Problems Confronting Traction Companies in Connection with the Disposal of Surplus and Obsolete Equipment," by John Y. Bayliss, Chairman of the Purchases and Stores Division of the Engineering Association of the American Electric Railway Association; "To What Extent, if any, are Industrial and Public Utility Corporations Interested as Buyers of Inactive or Surplus Material Belonging to Similar Companies?" (Round Table Discussion).

Lighting Equipment Association

HEADQUARTERS, 420 LEXINGTON AVENUE, NEW YORK CITY

CONVENTION AND EXHIBITION HELD

The Artistic Lighting Equipment Association held its annual convention and exhibition at the Hotel Sherman, Chicago, June 11 to 16, registering a complete success. Great numbers of people visited the exhibition and practically all the lighting equipment manufacturers in the country were represented at the technical and business meetings. A list of the papers related to non-ferrous metals was given on Page 284 of our previous issue.

The Institute of Metals

HEADQUARTERS, 36 VICTORIA STREET, LONDON, S. W. 1

The Liverpool Meeting of the Institute of Metals, to be held on September 4-7, is proving very attractive. Already over 200 members, including many from overseas, have indicated their intention of taking part in the meeting. The papers to be presented include a valuable series dealing with the die-casting of alloys, as well as the Eighth Report to the Corrosion Research Committee. A "full-dress" discussion of corrosion problems will be a feature of the meeting.

Personals

Dr. G. W. Thompson

Gustave W. Thompson, Chief Chemist and Director, National Lead Company, has been elected president of the American Society for Testing Materials.

Dr. Thompson was born in Brooklyn, July 27, 1865. He received a common school education. The Armour Institute, on June 9, 1927, conferred on him the degree of Doctor of Science.

Since 1892 he has been Chief Chemist of the National Lead Company. In 1916 he became a director of the company and is a director and officer of a number of its subsidiary corporations.

DR. G. W. THOMPSON

He became a member of the American Society for Testing Materials in 1903 and directed his activities principally on the committe that is now known as Committee D-1 on Preservative Coatings for Structural Materials, of which he was secretary for a number of years. When the Society's Committee E-1 on Methods of Testing was reorganized, Doctor Thompson was appointed a member of the Advisory Committee. He has also served on the Advisory Committee of Committee E-8 on Nomenclature and Definitions from its organization. He was twice a member of the Executive Committee, in 1912-1913 and in 1916-1918. He was elected to the Vice-Presidency of the Society in 1926.

In addition to holding membership in the Society, he is a member of the following scientific societies:

American Association for the Advancement of Science (Fellow); American Chemical Society; Society Chemical Industry; American Institute of Chemical Engineers (President in 1918); Chemists's Club (New York).

George Smith

The return of George Smith to the field of electroplating, as a vice-president of Hanson-Van Winkle-Munning Company of Matawan, New Jersey, in charge of their activities in the Central and Western States, is of interest to all those engaged in this industry.

Mr. Smith is a New Englander by birth. His first work was done with The General Electric Company at their Lynn, Mass., works. Later he was transferred to the Sprague division, where he had a varied and successful career, both as a designing and commercial engineer.

Joining A. P. Munning and Company in September, 1922, he took charge of automatic electroplating installations, directing the design of machinery. On August 1, 1923, Mr. Smith joined Roth Brothers and Company in Chicago as vice-president and general manager, where, among other types of electrical equipment, the Optimus electroplating generator was made under contract for A. P. Munning and Company.

Claude B. Schneible

Claude B. Schneible, a member of the sales department of the American Foundry Equipment Company, Mishawaka, Ind., from 1919 to 1924, has returned to that firm as factory representative after spending four years in engineering research in the chemical, oil and gas industries. Mr. Schneible was born in New York city in 1891, and after receiving an engineering education at Northwestern University, Chicago, entered the employ of the Mott Sand Blast Mfg. Co., Chicago. He held several plant positions with this firm and then joined the American Foundry Equipment Company in 1919. Mr. Schneible also is a member of Joseph Schneible Sons, Inc., Chicago, manufacturers of chemical equipment. He has perfected a number of chemical distillation and sandblast processes.

L. A. Glaser, of the McKenna Brass and Manufacturing Company, Pittsburgh, Pa., has been elected to the executive committee of the Pittsburgh Foundrymen's Association.

C. O. Mumger, Toledo, nationally known manufacturer of automobile starting, lighting and ignition systems, has recently been made director of the Monroe Auto Equipment Company, Monroe, Mich. He also is president of the Electric Auto-Lite Company, Toledo, and the U. S. L. Battery Corporation, Niagara Falls.

R. P. Heuer, formerly instructor in chemical engineering at the University of Pennsylvania, is now director of research for the General Refractories Company and will make his headquarters at that company's general offices at Philadelphia. In addition to directing the company's research laboratories at Baltimore, Dr. Heuer will devote much time to field work among refractories users.

William E. Walker was recently elected secretary and treasurer of the Central New York Foundrymen's Association. Mr. Walker is foundry manager for E. C. Stearns and Company, Syracuse, N. Y. He is a graduate of Colgate University and has held positions with the Perkins Foundry Company, Amsterdam, N. Y., the Wright-Martin Aircraft Corporation, New Brunswick, N. J., H. H. Franklin Manufacturing Company and the Lamson Company, Syracuse.

Charles D. Steinmeier, formerly assistant works manager of the American Foundry Equipment Company, Mishawaka, Ind., has been appointed sales representative for that company, in the Philadelphia territory. Mr. Steinmeier was foundry superintendent for the Nordyke and Marmon Manufacturing Company, Indianapolis, Ind., previous to 1919, when he became manager of the York, Pa., plant of the American Foundry Equipment Company. He was made assistant works manager when that company consolidated all its plants at Mishawaka. The company operates large foundry departments.

Obituaries

Norman A. Robertson

Norman A. Robertson, president of the John Robertson Company, 133 Water Street, Brooklyn, N. Y., hydraulic press manufacturers died May 24, 1928, at his summer home at Spring Lake, N. J., after a short illness.

Mr. Robertson was born in Brooklyn in 1870, the son of the late John Robertson, who founded the company bearing his name. He was graduated from the Brooklyn Polytechnic Institute and at once entered the employ of the company with which he was associated for 40 years. He was well known in the electric cable, rubber hose, blue lead and metal working industries, for which he developed and built much special machinery.

He is survived by his wife, a daughter and a son.

Edward C. Smith

Edward C. Smith, president and founder of the Edward C. Smith Company, Chicago, Ill., manufacturers of plumbing supplies, died on May 1, 1928.

News of the Industry

Industrial and Financial Events

National Lead Combines Subsidiaries

The National Lead Company has made a number of changes affecting personnel, location and branch distribution of some of its subsidiary companies, in order to effect economies in operation of its metal departments. The announcement gives the following changes:

E. T. Merrick, president of Hoyt Metal Company, was made manager of the metal department of the Atlantic branch, including the Metallurgical and Chemical Corporation at Matawan, N. J. Martin Newcomer, formerly with the U. S. Cartridge Company, was appointed production manager of metals under Mr. Merrick. C. E. Lilygren, formerly sales manager of the Hoyt Metals Company in New York, will have charge of the sales of mixed metals, with R. E. Smith as assistant in charge of cinch bolts. M. T. Little will take care of blue lead sales and H. G. Green of the solder sales. T. H. Markillie will handle sales of specialties. C. W. Gesregan, former manager of the Crooke works of the Atlantic branch, has been made purchaser of drosses and secondary metals for the entire metal department. The operations at the Crooke works will be discontinued.

In Philadelphia, the United Lead Company, Tatham Brothers works, will be consolidated with John T. Lewis & Brothers Company. F. C. Jussen, former manager of the United Lead Company branch at Philadelphia, becomes manager of the metal department of the combined offices, under John T. Lewis & Brothers Company.

At Baltimore a new branch of National Lead Company has been created as regards metals, combining the United Lead Company, the Jas. Robertson Lead Works and John T. Lewis & Brothers Company under C. E. McPhail as manager and C. A. Geatty as assistant manager. This branch will also do a strictly warehousing business in white-lead and kindred products for the Lewis company.

The United Lead Company branch at Cincinnati will be joined with the National Lead Company branch. H. W. Hundley, former manager of the United Lead Company in that city, has been made assistant manager of the new organization. W. A. Dail continues as manager at Cincinnati. Mr. Hundley will have charge of the blue lead sales of the consolidated branches.

At Chicago, the National Lead Company branch, under C. E. Field, manager, will take complete charge of both sales and manufacturing for all the company's Chicago interests, with the exception of linseed oil. The Raymond Lead Works will manufacture all of the lead pipe, sheet lead and such other press goods as may be required but all of the accounting will be removed to the National Lead Company's offices. The Hoyt company's manufacturing and warehousing branch in Chicago will be transferred to the National Lead Company's plant. G. J. Sharkey, who has been manager of the Hoyt company in Chicago, will move his office to the National Lead Company's quarters and look after sales of Hoyt and other metal products in the Chicago district under E. A. de Campi, assistant manager of the Chicago branch.

The Chicago branch of National Lead Company will also, take charge of Hoyt company sales in the Detroit territory.

L. H. Schneider, of the Hoyt company's Detroit office, will become a salesman for the Cincinnati branch of National Lead Company.

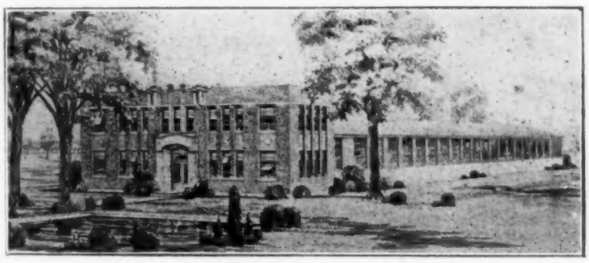
The offices of the Hoyt Metal Company in St. Louis will be transferred from the Boatman's Bank Building to the International Life Building.

Sue Aluminum Company for $9,000,000

Bausch Machine Tool Company, Springfield, Mass., has filed suit in Federal Court, Boston, for $9,000,000 damages against The Aluminum Company of America, and its officers, Arthur V. Davis, G. R. Gibbons, E. K. Davis, and R. A. Hunt. The plaintiff charged that the defendants entered into a conspiracy to create an aluminum monopoly in this country, to the detriment of other firms in the industry.

Larger Hill-Curtis Plant

As a result of its steadily expanding business in a wide variety of sawing, trimming, grinding and polishing equipment, the Hill-Curtis Company, Kalamazoo, Mich., has under construction a new plant which will give it added manufacturing space. The



NEW HILL-CURTIS PLANT

structure, as shown in the accompanying architect's drawing, is a great one- and two-story brick and steel fireproof building. This will house the company's offices as well as production departments.

Hill-Curtis Company was formed in 1881. W. C. Hammond is president.

Davis Now Aluminum Company Chairman

Arthur V. Davis, for many years president of the Aluminum Company of America, Pittsburgh, Pa., has resigned this office to become chairman of the board of directors. He is succeeded as president by Roy A. Hunt, formerly vice-president. Another change in the company's official roster is the resignation of Edward K. Davis, formerly vice-president and a director, who has been elected president of Aluminum Limited. In this connection it can be stated that Aluminum Limited was formed in Canada this year to take over all of the Canadian plants and properties of the Aluminum Company of America.

Fisher Brass Company Financing

The Fisher Brass Company, formed under Ohio laws in 1925 for the purpose of merging and operating the plants of The Atlas Brass Manufacturing Company, Bellefontaine, Ohio, a Fisher Brothers concern; The Regent Brass Foundry Company, Marysville, Ohio; and the Delaware Brass Company, Delaware, Ohio, all manufacturers of plumbers' brass goods, is issuing 13,246 units of capital stock, and is offering one share of no-par Class A preferred and one share of no-par common at $30, to yield 6⅔%. The company's gross sales the past three years have averaged over $1,097,000 per year.

Bohn Aluminum Buys Michigan Company

The Bohn Aluminum and Brass Company, Detroit, Mich., has purchased the plants and business of the Michigan Smelting and Refining Company, Detroit. The latter concern has two plants which produce brass ingots, solders, forgings, die castings, valves, boiler trimmings, plumbers' brass goods and other products. The Bohn company will thus expand its line of output and provide larger facilities for its old lines.

New General Cable Plant

The General Cable Corporation has purchased a plot on tidewater in Mobile, Alabama, and will erect a factory there for the manufacture of electric wire and cable, principally to serve utility companies in the southern part of the United States.

Will Make Bronze Lampposts

With freight rates on bronze lampposts from Minneapolis to the north Pacific coast to be cut virtually in half, the Flour City Ornamental Iron Works, Minneapolis, Minn., will begin the manufacture of ornamental bronze posts for use in salty climates, Eugene Tetzlaff, president and general manager of the company, has announced. The payroll of the company has already been increased over last year, with the volume of business to June 1, 1928, as large as for the entire year 1927. Two large contracts for ornamental iron and bronze work to be fabricated at the Minneapolis plant, totaling $700,000, will require a further increase in the number of employees, Mr. Tetzlaff said. Work has been started on the fabrication of ornamental iron and bronze for the Civic Opera company building at Chicago, the contract involving $500,000. Great bronze doors 20 feet high, bronze entrances and bronze windows for a massive war memorial to be erected at Indianapolis will be made by the Flour City company under a $200,000 contract.—H. C. B.

Incorporations

Gaskill Furnace Corporation has been organized at Warren, Ohio, through an arrangement of The Trumbull Manufacturing Company and the United Industrial Engineering Company. The new company is a subsidiary sales concern for furnaces manufactured by the Trumbull concern. The product will be a non-ferrous metal melting equipment.

The Metal Aircraft Corporation, Cincinnati, Ohio, has been organized with $500,000 capital, to manufacture all-metal airplanes and pontoons. A factory is to be constructed near the Lunken Airport. Incorporators include T. Higbee Embry, John B. Hollister and E. F. Lunken.

Business Reports of The Metal Industry Correspondents

New England States

Waterbury, Conn.

JULY 2, 1928.

Directors of the **Scovill Manufacturing Company** at their meeting last month declared a dividend of 75 cents a share, payable July 1 to stockholders of record June 22. This is an increase of 12½ cents over the rate paid the past year.

Charles S. Cook, formerly employed in the **American Brass Company** plants of this city and Ansonia, has been elected treasurer of the **Michigan Copper and Brass Company,** of Detroit. Previously he was assistant manager of the Buffalo plant of the American Brass Company.

Frank G. Smith, former technician and chemist of the **American Brass Company,** and now sales engineer of that concern is in charge of a brass and copper service piping exhibit which the company has on display at the 48th annual convention of the American Water Works Association at the Fairmont Hotel, San Francisco.

Harry B. Dow, secretary, and **Clifford H. Granger,** general manager, of the **Waterbury Clock Company,** and **Paul Lux,** president, **Fred Lux,** treasurer, and **Harry Soper,** secretary, of the **Lux Clock Company,** attended the annual meeting of the **American Clock Manufacturers' Association,** in New Haven last month. Representatives of the **Seth Thomas Clock Company,** of Thomaston, the **Sessions Clock Company,** of Bristol, the **Gilbert Clock Company,** of Torrington and the **New Haven Clock Company** also attended. **Smith F. Ferguson,** of New Haven, was elected president, **R. H. Matthieson,** of New York, vice president, and **W. S. Hayes,** of Philadelphia, secretary and treasurer. A review of the industry presented showed that 10,000 persons are directly engaged in clock making in the country; the annual output is 11,000,000 clocks and 1,500,000 clock movements; many of the present makers are direct descendants of the founders of the industry.

The new office building, laboratory and studio of the **Bristol Company,** costing $250,000, was opened last month. The company was founded 39 years ago by Prof. William H. Bristol.

David L. Summey, research engineer of the **Scovill Manufacturing Company,** has received a patent on a resistor and support. **George A. King,** of that company, has received a patent on a hinged double-pin locking fastener.

The Scovill Manufacturing Company had a small fire in its plating room last month. The fire was caused by an overflow of lacquer on a drying machine. Plant firemen extinguished the blaze before the city firemen arrived.

Frederick S. Chase, president of the **Chase Companies, Inc.,** and **John H. Goss,** vice president and general superintendent of the **Scovill Manufacturing Company,** were elected to the board of directors of the local Chamber of Commerce at its annual meeting last month.

The American Brass Company, together with industries in the lower Naugatuck valley, including Derby, Shelton and Ansonia, is bringing to the attention of authorities at Washington the need of deepening the Housatonic river channel as far up as Ansonia. It is claimed that the river could be deepened enough to permit much more shipping to and from Derby and Ansonia.—W. R. B.

Bridgeport, Conn.

JULY 2, 1928.

The Habirshaw Cable and Wire Corporation will be part of a large merger now being formed under the name of the National Electric Products Corporation.

Judge Alfred C. Baldwin of the Superior Court has reserved decision in the action brought by **Michael Mudre** against the **Remington Arms Company** asking $20,000 damages and a permanent injunction to prevent it from operating its switch engines over a railroad line connecting the plant with the main line of the New Haven road. Mr. Mudre alleges that property owned by him adjoining the company's line has depreciated in value because of smoke and gases from the engines and he has suffered loss from tenants leaving his property because of this condition. The company produced experts who testified that the damage from the smoke and gases was negligible. **W. Stewart Clark,** general manager of the **General Electric Company,** stated that his company would be forced to shut down if the injunction were issued. He said that 80 per cent of the shipping of his company is hauled over the Remington Arms' railroad by the latter's engines. This would throw 3,000 employes out of work in addition to those thrown out of work at the Remington Arms plant.

Thomas E. Dunn, assistant works manager, has been appointed works manager of the **Bullard Machine Tool Company.** This does not mean that **Stanley H. Bullard,** vice president and, for a long time, works manager, is withdrawing from active service, it is said, but that he will devote more time to general activities rather than to production. Mr. Dunn is a graduate of Brown and has been with the **Franklyn Motors Company,** the **General Electric Company,** and the **Crocker-Wheeler Company** of Ampere, N. J., coming here in 1917 as night superintendent.

Dwight Wheeler, for forty-five years president of the **Acme Shear Company,** died at his home on Noble Avenue, June 6, at the age of 86. The funeral was held June 8, with burial in Bridgewater, Conn. He is survived by his brother, David C. Wheeler, treasurer of the Acme Company, three nephews, Dwight C. Wheeler, secretary and manager of the company; Joseph A. Sperry, a foreman; and James Goldsmith.

W. Glenn Shelton, sales manager of the **Remington Arms Company,** was the speaker at the monthly dinner of the Bridgeport Sales Managers' Association June 19th.

The United States Navy, needing some airplane engine parts in a hurry, sent two hydroplanes to Bridgeport last month to get the parts from the **Locomobile Company** plant. The planes landed in the harbor and taxied across it to the dock of the Locomobile Company, where the parts were waiting for them. They flew away in a few minutes.—W. R. B.

Connecticut Notes

JULY 2, 1928.

HARTFORD—The **Underwood Computing Machine Company**, owned by interests identified with the former **Underwood Typewriter Company**, now consolidated with the former Elliot **Fisher Company**, is to be bought by the new **Underwood-Elliot Fisher Company**. Purchase has been agreed upon by an exchange of stock, Underwood-Elliot to pay 30,000 shares of its stock. On the basis of present prices, this represents a payment of $2,050,000. The operating income of Underwood Computing in 1926 was $333,865, compared to $223,874 the previous year.

Directors of the **Billings and Spencer Company** have elected A. H. **Deute**, of New York, vice-president to succeed the late Arthur **W. Fox**. Mr. Deute has been identified with the Borden **Company**.

The **Carlyle Johnson Machine Company** directors have elected **Scott H. Simon** president, succeeding the late **John Stambaugh**. He has been with the company since it began business here in 1904.

The **Pratt and Whitney Company** is now operating a night shift in several departments, including the planing, milling, boring, hand screw and lathe departments. A general pick up in industry throughout the country has resulted in large orders for machine tools, the officials say.

The **Underwood-Elliot Fisher Company** is to construct a new power plant at a cost of $300,000; it will be ready by the first of next year. The new stack will be 200 feet in height as compared to the present 153 foot stack.

NEW BRITAIN—A survey made last month on some of the leading industries here shows in all cases an increase in surplus and assets during the past 10 years.

Directors of the **North and Judd Manufacturing Company** have declared an extra dividend of two per cent in addition to the regular quarterly dividend of two per cent, both payable July 1 to stockholders of record June 21.

The **New Britain Machine Company** is retiring one-third of its preferred stock at $105 a share. The stock to be retired is valued at $500,000.

Vice-president **Walter H. Hart** of the **Stanley Works** and **William H. Booth**, secretary of the **Corbin Cabinet Lock Company** arranged for a reunion of the class of 1893 of the New Britain High School at the Shuttle Meadow Club last month. The former was president and the latter was secretary of the class.

BRISTOL—**Charles Treadway**, vice-president of the **Horton Manufacturing Company** and a director of the **American Silver Company**, has resigned as president of the **North Side Bank and Trust Company** in order to devote his time to his other business interests. He was recently elected a director of the newly organized **Veeder-Root Company**.

The **American Silver Company** has declared the regular quarterly dividend of two per cent, payable July 2 to stockholders of record June 25.

TERRYVILLE—The screw department, one of the largest divisions of the Eagle Lock Company, has started working on a schedule of nine hours a day. Many other departments are scheduled to go on a nine hour schedule shortly. Hitherto the whole plant has been on a schedule of eight hours a day.

TORRINGTON—The Torrington Company directors at a meeting here June 14 voted to recommend to the stockholders that at their next annual meeting, to be held in September, the capital stock of the company be increased from 280,000 shares of par value of $25 to 560,000 shares of no par value. If the stockholders approve this plan they will receive two shares of the new stock for each share now held. The directors also declared the regular quarterly dividend of three per cent and an extra dividend of five per cent, payable July 1. For the past two years the company has been paying annually four quarterly dividends of three per cent each and two extra dividends of five per cent each, making a total annual dividend of 22 per cent. The impression seems to be that after the stock increase the dividend rate will be established at from 10 to 12 per cent. The stock is now selling at $117. The company manufactures machine needles of all kinds, bicycle and automobile spokes and nipples, ball bearing and vacuum cleaners. Beside its local plant it has plants in Essex, Conn.; Upper Bedford, Que.; Aachen, Germany and Coventry, England. Its surplus is now in excess of $3,000,000.

The Dayton Manufacturing Company, of this city, makers of automobile accessories and supplies, will erect a two story factory building shortly to care for increasing business. It now employs about 80 hands.—W. R. B.

Providence, R. I.

JULY 2, 1928.

Following a six months of fairly steady activity in practically all of the metal lines of industry, which has not been exceeded since pre-war days, July opens with every indication of a continuance of these satisfactory conditions. There has been no booms, no rushes, but a constant steady activity that has kept things moving evenly and consistently. With building trades active and the jewelry lines working relatively full schedules the small tool trades and the various co-ordinate branches of the larger trades have felt the stimulus and have been correspondingly busy. Everything at present points to months of activity that is very encouraging to both employer and employe.

Ninety members of the grinding department of the **Brown and Sharpe Manufacturing Company**, and their friends enjoyed an annual field day and outing with a special dinner at the Twin Elm Farm in Harmony, Saturday afternoon, June 16.

The Lacquer Sales Corporation has been granted a charter under the laws of Rhode Island to manufacture and deal in lacquers, etc., with headquarters in Providence. The authorized capital is $33,000 consisting of 2,600 shares of common stock at $5 each and 200 shares of preferred at $100 each. The incorporators are **Amedeo Morvillo**, of East Providence; **Carlo Morvillo, Lawrence H. Simon** and **Charles R. Kapstein**.

Frederick de Caesaris, 111 Wales Street, Cranston, has filed a statement with the city clerk of Providence, that he is the sole owner of **The Century Tool and Die Company**, 109 Friendship Street, Providence.

Nathan White, Inc., is the style of a new corporation that has been chartered here to deal in metals, with headquarters in Providence. The incorporators are **Nathan White, Jennie White** and **Leonard White**, all of Providence, and the authorized capital consists of 100 shares of no par common.

Gaspee Pipe and Supply Company, Inc., which will locate in Providence, is capitalized at $25,000; to deal in heating, plumbing and sprinkler equipment; has obtaned a charter under the laws of Rhode Island. The incorporators are **Edward J. Sullivan Jr., Arthur Wilby** and **Francis J. O'Brien**.

A charter has been granted to the **Heatrite Corporation**, which will be located in Providence, to deal in heating and ventilating equipment; capital stock is $50,000. The incorporators are **George Kabureck, Winthrop A. Rember**, and **Philip V. Marcus**, all of Providence.

The two-story wooden factory building of the **Shelloid Company**, manufacturers of lacquers, etc., on Spragueville Road, in Smithfield was destroyed by fire Saturday, June 6, with a loss of $150,000, according to estimates given by **Richard E. O'Donnell**, president and general manager of the concern. **Clifford A. Brownell**, treasurer of the firm said he thought the fire started from a spark blown from the chimney of the factory back into the building itself.

After a hearing lasting a couple of days before Judge Capotosto in Superior Court the jury returned a verdict for the plaintiff, the **Bay State Insulated Wire and Cable Company**, for $554.53 in its suit against the **Waldman Manufacturing Company** on a disputed book account.

Albert W. Claflin, of **The George L. Claflin Company**, of Providence and Attleboro, officiated as toastmaster at the annual dinner of the John Appleton Club of Brown University graduates at the commencement reunion held at the Wannamoisett Country Club on June 16. Mr. Claflin is honorary president of the Providence-Attleboro Branch of the **American Electroplaters' Society**.

Edward J. Finucane, doing business as an electroplater, polisher and nickel worker at 12 Beverly Street this city, has made a general assignment for the benefit of his creditors to **Henry M. Benson**, 36 Exchange Place, to whom all payments due Mr. Finucane are to be made and with whom all claims of creditors must be filed for adjudication. The entire plant, including machinery, tools, fixtures and all equipment, is to be disposed of at assignee's auction sale.

The Gorham Manufacturing Company is preparing to cast at its bronze foundry at Elmwood a heroic statue of the late Bowen R. Church, for many years cornet soloist with Reeves American Band of this city and also with the Gilmore's Band of New York. The statue, which is seven feet in height, by the sculptor Aristide B. Cianfarani, will stand on a granite base in a lake in Roger Williams Park, this city, directly opposite the bandstand where he regaled thousand of music lovers years ago.

The General Sheet Metal Works, Inc., a corporation to be located in Providence with a capital of 120 shares of common non par stock, to engage in a sheet metal and cornice work business, has received a charter. The incorporators are **David Jaffe, Max Wexler** and **Philip Wexler.**—W. H. M.

Middle Atlantic States

Trenton, N. J.

JULY 2, 1928.

The Roller Bearing Company of America, Newark, is making preparations to move its equipment from the Newark factory to the plant of the **Mercer Motor Car Company** in this city. The work of moving has been held up but it is said that all the machinery and equipment is expected to arrive within a short time. The Mercer company occupies 11½ acres; the buildings have 175,000 square feet of floor space. The Roller Bearing Company is moving from its Newark plant because of its need for a larger factory.

The J. L. Mott Company continues to operate five days a week in all departments, while the **Skillman Hardware Manufacturing Company** is operating 80 per cent of capacity. Other concerns report some improvement.

The Lott Universal Roller Bearing Corporation, Jersey City, has been chartered here with 30,000 no par shares, to manufacture roller bearings. The incorporators are F. J. White, W. Varndell and Kenneth D. McLaren, all of Jersey City. **Blue Streak Air Lines, Inc.,** Toms River, N. J., has been chartered with $62,500 and 625 common, no par shares to manufacture aeroplanes. The incorporators are William H. Fischer and Owen E. Pomeroy, Toms River; William S. MacLaren, Beachwood, and Benjamin F. Butler, Bayville. Other concerns chartered were:

Eastern Smelting and Refining Company, Atlantic City, 2,500 no par shares, to refine metals. **A. Nere, Inc.,** Hoboken, $125,000 capital, to manufacture electric motors. **Radium Emanator Filter Company, Inc.,** North Haledon, $100,000 capital, to manufacture filters. —C. A. L.

Newark, N. J.

JULY 2, 1928.

The Goodwin-Pray Company of Newark has purchased the two story factory building at 290 and 292 Chestnut Street. The Building was originally occupied by the **Ivori Craft Corporation,** manufacturers of novelties. The new owners will use the premises for the repairing and manufacturing of electrical products. The Goodwin-Pray Company has been located for a number of years at Austin and Murray Streets. The new plant is of two stories and covers a plot 50 x 151 feet.

Universal Metal Box and Products Company, 144 Bleecker Street, engaged in the manufacture of metal boxes for electrical installation, will shortly occupy the modern one-story brick factory building at 316 Colt Street, Irvington. The new company will add to the present structure until it covers 20,000 square feet of floor space. The **Newark Metal Casting and Litho Company** formerly occupied the premises.

Newark concerns just incorporated include the following:

International Metal Bed Company, $125,000, manufacture metal beds. **Rite Manufacturing Company,** 2,500 shares no par, manufacture air valves. **Jewell Lamos, Inc.,** $125,000, manufacture electric bulbs. **John F. Giles and Sons Company,** $25,000, manufacture fountain pens. **Art Metal Works,** 190,000 shares no par, manufacture ecclesiastical metal statuary. —C. A. L.

Middle Western States

Detroit, Mich.

JULY 2, 1928.

Negotiations for a $10,000,000 merger of the **Bohn Aluminum and Brass Corporation** and the **Michigan Smelting and Refining Company** have been completed, it is announced, and approved by the board of directors of both organizations.

The Owosso Foundry Company, at Owosso, Mich., incorporated for $50,000, has leased the plant formerly occupied by the **Standard Machinery Company** in that place, and plans to be in production about July 1. The company will manufacture gray iron castings, chiefly for the automobile trade. Machinery costing between $50,000 and $75,000 will be installed. The plant will have a capacity of 50 tons of gray iron castings daily. Officers of the company are, president, **H. C. Vance;** vice president, **C. C. Vance;** secretary and treasurer, **R. B. Coster.**

The following officers and directors have recently been elected by the **Michigan Valve and Foundry Company,** Detroit: President, **C. H. Haberkorn, Jr.;** vice-president, **F. B. Stevens;** vice-president and general manager, **Dean Emerson;** vice-president and secretary, **E. S. Jackson;** treasurer, **R. M. Allan.** Directors: **W. A. Fisher,** president, **Fisher Body Corporation; John J. Barlum,** president, **American State Bank; Henry T. Cole,** president, **U. S. Radiator Corporation; F. W. Shuell,** president, **Ever Hot Water Company; D. Dwight Douglas,** president, **First National Bank; R. M. Allan,** vice-president, **American State Bank; C. H. Habercorn, Jr.,** chairman of the board, **Bank of Detroit; F. B. Stevens,** president, **F. B. Stevens, Inc.; James T. Whitehead,** president, **Whitehead and Kales Company.** All these officers represent large industrial organizations in Detroit.

The Continental Motors Corporation, of Detroit and Muskegon, is expected to enter the production of airplane motors at some future date, although no definite announcement has yet been made. The company has been experimenting with plane motors for many months.

Raymond P. Winberg, assistant sales manager of the **Mueller Brass Company,** Port Huron has resigned to accept a position with the **Rome Brass and Copper Company,** Rome, New York.

The McCord Radiator and Manufacturing Company, it is stated, has obtained a large contract from the **Chrysler Corporation.** This company reports a gain of 18 per cent in sales for the first four months of 1928, compared with the same period of a year ago. Profit for the four months' period of this year was $253,000, it is announced.

The Wolverine Plating Company, 459 Brady Street, Detroit, has recently been incorporated with a capital stock of $15,000. The stockholders are **Jerry Callahan, Maurice Bruns** and **John Tyler, Jr.,** all of Detroit.

The Hall Lamp Company, Detroit, reports earnings of $195,000 after all charges including depreciation for the first quarter of 1928, equal to 49 cents a share on the capital stock. New contracts and heavy releases have resulted in marked expansion of the business, sales being nearly double those of a year ago, it is reported. Operations are at the highest point ever attained by the company.

The Lakey Foundry and Machine Company, Muskegon, which produces castings for automobile manufacturers, reports a 55 per cent increase in business during the first six months of its fiscal year as compared with the first six months of the preceding year. In the first six months of the 1927 fiscal year, castings amounting to 26,260,067 pounds were pro-

duced, and in the first six months of the 1928 fiscal year, a total of 40,669,824 pounds were shipped.

The Stanley Foundry Company, Grand Rapids, operated by **F. W. Stanley** and **Samuel Silverman,** recently purchased the Grand Rapids foundry plant of the **National Brass Company.** The new plant will be operated as the Stanley plant No. 2.

An important new industry for the Greater Detroit area in the Novi **Stovecab Corporation,** whose well-equipped plant at Novi is just getting into operation. The stove cabinet is one of the most recent improvements in kitchen equipment. It is nickel trimmed and finished to harmonize with the general color tone of the kitchen. It encloses the stove, yet affords free access to oven and hot plates. —F. J. H.

Toledo, Ohio

JULY 2, 1928.

Non-ferrous metal and plating plants in this territory are well settled into summer production schedules. Practically every one is busy and running largely to production capacity.

Toledo, particularly, is one of the most prosperous cities along the Great Lakes. As in Detroit and Cleveland, many of these plants are busy on motor car work. This field is particularly active at this time and has favorable future prospects. It is believed present activities will continue until well along into the fall. There is but little concern over unemployment and the labor situation is of the best. —F. J. H.

Cleveland, Ohio

JULY 2, 1928.

Favorable reports come from the brass, copper and aluminum plants in this city and surrounding territory. Most of them are busy, in fact, some are operating to capacity.

Conditions, compared with a month ago, show a considerable betterment. It is also pleasing that prospects are good for the future. It is quite evident the present favorable conditions are due to prevail for a considerable time. More persons are employed in the non-ferrous metal and plating plants at this time than for many months.

The motor car industry continues the dominant factor in almost every line of industry. This seems to regulate conditions, and, as in the past, continues to have a large place when it comes to making industrial forecasts. Cleveland is well supplied with accessory plants and these are largely in the non-ferrous field. Practically all of such industries are now extremely busy, with a favorable outlook for the next several months. —F. J. H.

Chicago, Ill.

JULY 2, 1928.

From the standpoint of locality, Illinois is a key to the entire Mississippi Valley and is a distributing point to forty million people. As a result, Chicago occupies a strategic position in business which gives to it a remarkable national advantage.

The recent adjustment of freight rates to and from this territory and the territory south of the Ohio River and east of the Mississippi River, otherwise known as the Southern Classification territory, put into effect by the Interstate Commerce Commission, places this territory in a position to compete more favorably with eastern cities for business in the southern part of the United States.

Dallas Brass and Copper Company, Chicago, recently completed a new laboratory located in its rolling mill plant. Additional equipment is particularly adapted to analyze mixtures sent in by customers for duplication in rolling sheets and strips. This eliminates trouble experienced by customers through the use of improper mixtures or tempers which often cause distress and loss to the trade. **Dallas Brass and Copper Company** is shipping pure Lake Superior copper flat and oval anodes in considerable quantities. —W. S. H.

The Commercial Credit Company has sold all its stock in the **Checker Manufacturing Company** and retires from the management. **Morris Martin,** vice-president and general manager of Checker, was elected president to succeed **Durane R. Mills.**

The Motograph Corporation of America was incorporated in Chicago June 19. The firm will manufacture and deal in advertising signs and electrical devices. The incorporators are Harry B. Barker, G. H. Fried and H. G. Forde. Capitalization was quoted at 40,000 shares of no par value.

The Great Lakes Litho and Printing Company, Inc., was incorporated here, with a capital of $50,000. The firm will do a general business of lithographers, printers and engravers. The incorporators are Calvin R. Perry, Lester J. Robinson and J. Robinson. —A. P. N.

Milwaukee, Wis.

JULY 2, 1928.

Beginning a comprehensive program of metallurgical research to aid Wisconsin manufacturers, eight Milwaukee foundries and one located in Racine have presented a $15,000 fund to the University of Wisconsin College of Engineering. The gift has been accepted by the university's Board of Regents. Engineering professors will commence immediately the problem in metallurgy outlined by the foundries' research committee. **Harold S. Falk,** of Milwaukee, chairman of the research group, predicted that the problem given at the outset may occupy three years. The sum will be turned over to university authorities in $5,000 annual payments for three years. Each of the nine companies contributes and shares equally in the results attained.

Firms contributing to the fund are the Falk Corporation, Bucyrus-Erie Company, Harnischfeger Corporation, Sivyer Steel Casting Company, Wehr Steel Company, National Brake and Electric Company, George H. Smith Steel Casting Company and Milwaukee Steel Foundry, all of Milwaukee, and the Racine Steel Casting Company, Racine, Wis.

John H. Baker, of Menominee, Mich., has been appointed manager of the **Michigan Electrochemical** plant to succeed **A. R. White,** who recently left to take charge of the company's operations in the West. Accession to the management of the Menominee plant is a promotion that comes to Mr. Baker as a reward for faithful service and efficiency. When the Menominee plant was first put into operation, Mr. Baker entered as foreman and was later made superintendent. His appointment as manager was voted at a meeting of the directors of the corporation at Philadelphia.

George Vits, president of the **Aluminum Goods Manufacturing Company,** Manitowoc, Wis., announced on Wednesday, June 6, a new free sickness and accident insurance policy for every member of the organization. This group policy becomes effective July 1, 1928, and affects about 3,000 employees. The policy is very liberal. Every employee, regardless of age or physical condition, is automatically subject to its benefits. It covers all types of accidents or illness without restriction.

The Appleton Machinery Company, Appleton, Wis., has begun building a new foundry building, according to **F. E. Saecker,** president. It will cost about $75,000 and will be of brick and steel frame construction. —A. P. N.

Other Countries

Birmingham, England

JUNE 18, 1928.

Preparations are being made for an extensive enlargement of the British Industries Fair, which will be held from February 18 to March 1, 1929, at Castle Bromwich. Last year the area was extended by 130,000 square feet; the next enlargement will give a total of 400,000 square feet. Metals and hardware will again occupy the chief position and Birmingham will be the principal contributor.

The new Government order requiring cycles to show rear lights has given a great impetus to the lamp industry. There are approximately eight million cycles in Britain and the task of providing the necessary lamps is divided among only 13 firms. With the exception of the lenses, the lamps are as a whole British made. The factories have orders sufficient to last them for sev-

eral months to come. The railway section of the lamp trade has received very good orders from India, South America and South Africa, and a number of Northern firms who have booked orders for locomotives are coming to Birmingham for their lamps. To an increasing extent the lamp trade is benefiting from the very great growth in the public omnibus services in different parts of the country. Manufacturers of bicycles have had the busiest season for some years and a great deal of overtime has been worked. This has made the factories devoted to cycle accessories extremely busy.

The makers of aluminum hollow-ware are disposed to follow the example of Germany by adopting standardization. To some extent this has appealed not only to Germany but to America. The idea is to adopt certain grades carrying an appropriate mark which will give an assurance to the buyer that the article purchased will give a certain recognized service. Consultations with German manufacturers have taken place with a view to the adoption of some similar system in this country.

The trade in metal buttons will benefit very considerably through the application of the Safeguarding of Industries Act, the effect of which will be to impose a duty of 33⅓ per cent. The trade has long sought to impress the Government with the necessity of a protective tariff against Germany, and it is commonly estimated that within the next twelve months employment in this industry will be increased by 50 per cent as the result of the tax.

Prior to the war, Britain imported from Germany approximately 500 tons per annum of nickeled, brassed and coppered zinc sheets. A small tonnage was produced in Great Britain, but its quality was generally considered unsatisfactory, a common complaint being that the metal coating, especially the nickel, peeled off in bending or stamping operations. The production of Birmingham ware of this description commenced in 1919 and there is now a big business in the manufacture of coated zinc sheets. The production has since been very successfully carried on, and the makers claim that their sheets have a better finish than the German product, while they stand very successfully stamping, punching and pressing operations without cracking or peeling of the coating. One firm alone is supplying larger quantities than the entire tonnage formerly imported from Germany. A somewhat peculiar demand comes from Japan, which takes very large quantities of polished nickel sheets for use as mirrors.

The Birmingham Jewelers and Silversmiths Association announces in its annual report that the recommendations in regard to standard trade descriptions adopted by manufacturing goldsmiths in Birmingham in 1923 have now been approved and adopted by the Birmingham Jewelers and Silversmiths Association, the London Wholesale Jewelers and Allied Trades Association, the Federation of Master Goldsmiths and Jewelers, and the National Association of Goldsmiths. Among these requirements is one that no goods of a standard lower than 9 carat shall be described as gold. The term "fine gold" shall not be applied to anything but pure gold. Such terms as "bright gold," etc., shall be abolished. Definitions are given of gold front, rolled gold, gold filled, gold shell, gold cased, and gilt.

The demand for electroplate and silver plate, both in Birmingham and Sheffield, is slow and unsatisfactory, although some orders have been obtained from hotels. —J. H.

Business Items–Verified

Joseph Dixon Crucible Company, Jersey City, N. J., announces that the new address of its Chicago district sales office is 2003 Builders' Building, Wacker Drive and La Salle Street, Chicago, Ill.

Singmaster and Breyer, metallurgists and chemical engineers, Graybar Building, 420 Lexington Avenue, New York, announce their removal from Room 1647 to Rooms 2831-2833, in the same building, as of June 15. Their new telephone number is Lexington 0334.

E. Reed Burns & Sons, Inc., 1037 East 62nd Street, Cleveland, Ohio, announce that **Hunter and Wilkie,** 508 Kerr Building, 642 Beaubien Street, Detroit, Michigan, are now their representatives for the sale of polishing compositions in the city of Detroit and adjacent territory.

Hill-Curtis Company, Kalamazoo, Mich., manufacturers of sawing equipment and polishing and grinding machinery, is constructing a large new building to house its steadily expanding activities. The building will be a large one and two-story, brick and steel structure covering a large area.

The Aluminum Company of America has commenced the manufacture of barium and zinc fluorides, which find an increasing interest in the enamel, glass, tile and brick trades. **Charles Hardy, Inc.,** of 100 East 42nd Street, New York, have been appointed distributing agents for the United States for these products.

Beehler Steel Products Company, St. Louis, Mo., has removed to new and larger quarters at 1500 Kingsland Avenue, where the company has a large concrete and steel plant with full modern equipment for the manufacture of steel, brass and aluminum stampings in all finishes, and standard and special trunk hardware.

The Consolidated Brass Company has been formed at Detroit as the result of a merger of the American Lubricator and Brass Company and the Sterling and Skinner Manufacturing Company, both of Detroit. The company will manufacture a variety of brass goods, operating brass foundries and machine shops. It is stated that no new equipment will be needed at this time.

J. H. Gautier and Company, 1 Greene Street, Jersey City, N. J., manufacturers of crucibles, refractories, etc., whose plant was recently damaged by fire, states that a reported figure of $75,000 damage was greatly exaggerated. No loss was sustained in either the crucible department or the boiler house, and very little equipment was lost. The company is operating steadily.

Norman F. Robertson has been elected president of the **John Robertson Company, Inc.,** 133 Water Street, Brooklyn, N. Y., succeeding his father, the late Norman A. Robertson, who died on May 24. Mr. Robertson has been secretary of the company since 1924. **Allan R. Hardie,** treasurer of the company, has now been made secretary and treasurer.

Pennsylvania Bronze and Brass Company, Inc., Philadelphia, Pa., has been formed by the merger of the Aetna Foundry Company and the Pennsylvania Bronze and Brass Company, Inc., both of Philadelphia. Non-ferrous work will be performed at the Pennsylvania Bronze plant, 22nd and Master Streets, and grey iron and semi-steel work at the Aetna plant at 20th Street above Hunting Park Avenue.

The Brown Instrument Company, Philadelphia, Pa., makers of industrial and power plant indicating, recording and automatic control instruments for measuring temperature, pressure, fluid, flow, machine speed, percent CO^2 in furnace flue gases, etc., is building another addition to its plant. The new structure will be 60 ft. long by 44 ft. deep and two stories in height. Its primary purpose is to provide research facilities commensurate with the needs imposed by the rapid expansion of the company's interests.

Rochester Brass and Wire Works Company, 76-78 Exchange Street, Rochester, N. Y., manufacturers of a wide variety of wire products, fence builders, etc., are erecting a new factory building at 36-46 Mount Hope Avenue, Rochester, where they will have about 20,000 sq. ft. of floor space. The company plans to expand its present production and to add such products as ornamental brass and bronze work, light iron work, etc. All new equipment is to be installed. The old building on Exchange Street has been sold.

Robert Mitchell Company, Ltd., Montreal, Que., has purchased the plant of the National Bronze Company, Ltd., Montreal, which specializes in production of bronze bearings for railways, pulp and paper mills, etc. President Roast of National Bronze, is now chief chemist and metallurgist for the Mitchell Company. The purchased plant has a nonferrous foundry, brass machine shop, tool room, casting shop, cutting, spinning and stamping sections, soldering and brazing room and plating, polishing, grinding and lacquering departments.

The Roller-Smith Company, 233 Broadway, New York, an-

nounces the following changes in its sales organization: The state of Texas is now being handled by **John A. Coleman,** 1006 Washington Avenue, Houston; Colorado, Utah, Wyoming and Northern New Mexico are now being handled by H. T. Weeks, U. S. National Bank Building, Denver, Colo. Both Mr. Coleman and Mr. Weeks are men of wide experience in the electrical business and with the territories that they are covering. Both will handle the entire line of Roller-Smith products including electrical measuring instruments, relays and circuit breakers.

Review of Wrought Metal Business

By J. J. WHITEHEAD,
President, Whitehead Metal Products, New York, N. Y.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

One of the outstanding items of interest that has developed in the past month or two is a definite trend toward white metals in the architectural field. For new work, architects have been asking for a metal that would stay white permanently and afford opportunity for combinations with bronze and brass to obtain unusual and striking effects. The development of the futuristic art work has come rather suddenly to the architectural world which has been startled by the radical characters of the designs for the new building of the Union Trust Company, at Detroit, Michigan. This is a very large building about thirty stories in height and the banking quarters are done entirely in the futuristic style with white metal throughout. For this job Monel Metal has been selected because of the need of carrying out the effects with a metal free from the yellow cast that is observed in most copper nickel alloys. There are twelve elevator doors opening from the main banking quarters constructed entirely of Monel Metal with inlaid glass effects in a design which a few years ago would have been considered as being extremely weird. All the grilles and counters in the bank are made to carry out the same effect. The doors are being built by the Dahlstrom Metallic Door Company of Jamestown, N. Y., and the bank fixtures are being made by the Gorham Company. The requirements for this job call for about fifty tons of Monel Metal and it is the first of its kind in the world.

One of the branches of the National City Bank recently opened, is finished with a nickel-copper alloy made with about 20% nickel, 65% copper and 15% zinc. For this job, the straw colored cast of the metal was quite in harmony with the other trim work including the marble.

This development is worthy of note not only from the fact that it is a radical departure from the traditional bronze specification for this class of work, but mainly because in numerous places where steel and iron were formerly used, the copper-nickel alloys are now being specified. The result will be a further extension of the use of metals.

It is a long jump from banking quarters to the manufacture of soup, but the Campbell Company in a new plant which they are building in Chicago have specified Monel Metal and Nickel for numerous parts of the factory where non-rusting and sanitary requirements must be met. The Pittsburgh Plate Glass Company have bought about twenty tons of pure nickel tubes and sheet for their caustic soda plant at Barberton, Ohio, following in this the lead of many other similar plants in which it has been demonstrated that pure nickel is the only metal that can be used to produce pure caustic soda and its various affiliated chemical products.

Producers of Monel Metal and pure nickel have full order books and are in a prosperous position. The same is true of manufacturers of brass and copper fabricated forms. Nearly all of the producers of these metals in sheet, rod, tube and wire are running at full capacity with only one complaint; i.e., labor shortage. Practically all departments are in full swing with many items on the basis of a six weeks delivery. This condition has necessarily reacted to the benefit of those distributors who were foresighted enough to put in a well rounded stock of standard sizes and shapes so that spot deliveries could be offered from stock.

There is no indication of any lessoning of this activity and all hands are feeling very well pleased with conditions.

Metal Market Review

By R. J. HOUSTON,
D. Houston & Company, Metal Brokers, New York

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

COPPER

JULY 2, 1928.

A large volume of sales in June provided ample outlet for production. This business included both domestic and foreign requirement. The demand for home account was maintained at an excellent rate on the basis of 14¼ cents per pound delivered at Connecticut Valley points. Export sales were persistently heavy at 15 cents c. i. f. European ports. These prices have been effective for several weeks.

World demand has risen to a high level, and the stability and strength of the market are the logical results of favorable developments.

The statistical position of copper reflects the underlying soundness of the situation. During the month of May the output of refined copper amounted to 258,472,000 pounds. The total shipments for the same periods, however, rose to 271,682,000 pounds, or 13,210,000 pounds in excess of refinery production. Stocks of refined metal on June 1 were only 132,576,000 pounds, and compared with 216,158,000 pounds a year ago, showing a reduction of 83,582,000 pounds. In view of the great potentialities of the situation the present level of values is recognized as most conservative. Closing prices were 14¼ cents delivered Connecticut and 15 cents c. i. f. European ports. Market quiet but firm.

ZINC

A favorable construction was placed upon recent zinc statistics owing to the small increase in stocks. Market conditions were steady and a fair business noted, but there was not enough demand to infuse buoyancy into the situation. There are indications of unfilled requirements which will have to be covered in the near future. If this pent up demand becomes as large as expected the market will undoubtedly show improvement. There has been considerable resistance to further depressing influences, and if ore sales continue in excess of production it will strengthen the situation in a definite way. The statistical statement for May showed an output during that month of 53,422 tons and total shipments of 52,956 tons. Domestic deliveries amounted to 49,818 tons, or an increase over April shipments of 3,301 tons. Stocks on June 1 were 45,225 tons, an increase of only 466 tons.

TIN

Extreme weakness was the outstanding feature in the tin market last month. Prices melted away at a rapid rate indicating a most pessimistic attitude in trade circles. General contributing causes operated to unsettle the market and drive prices downward. The major reasons for the pronounced depression were the persistent selling by London and Singapore on a declining scale, a large increase in visible supplies, expanding production

and the expectation that forces were in motion making for lower prices.

Tin has always responded readily to manipulation. Speculators found ample scope for vigorous action in this metal, especially on the London Metal Exchange, and being in comparatively limited supply it afforded unusual opportunities for speculative operations. It is the chosen metal for both bull and bear movements. Values are pushed up to an artificial height and by a reversal of policy driven down at a drastic rate. There may be some regard to technical and basic conditions, but they frequently play a small part in market developments. On June 19 Straits tin sold at 46½ cents compared with 49⅝ cents on June 1. A year previous the market price was 67⅞ cents and the high quotation in 1927 was 71 cents on February 25. Recent low market levels brought in buyers, however, and the local market rallied somewhat on a substantial amount of business. Straits tin touched as low as 45⅝ cents on June 21. At this writing there was some improvement with quotations of 46⅛ cents to 46¾ cents for July delivery.

LEAD

Buyers of lead were able to cover both spot and future requirement during the past month at 6.30c per pound New York, and 6.15c at East St. Louis. The domestic market remained remarkably steady during June, but there were no developments sufficiently encouraging to create an upward tendency. The London market showed minor fluctuations lately, but operations at that center were in large volume. Domestic buying was on a good scale and the favorable statistics for May, and the reduction in refined stocks of 2,790 tons along with curtailment of refined output is regarded as a tangible sign that the position of lead is improving.

ALUMINUM

A stabilized market for aluminum is an established fact, and there are no factors to seriously disturb this situation. Domestic consumption is on a large scale. Automotive plants are absorbing a heavy tonnage of the metal every month and important shipments are going forward regularly to other industries. The use of aluminum is on the increase in Europe and to stimulate its further use the foreign Aluminum Cartel is reported to have reduced the price of wire bars £9 to £10 per ton.

ANTIMONY

Easier market conditions developed in antimony during the past month. Considerable selling pressure caused prices to yield about a full cent per pound recently, and present quotations for Chinese regulus are 9½c to 9⅝c for both spot and future arrivals duty paid. China offerings, however, were above the New York parity lately, but demand is not eager enough to start a new upward movement. There was a fairly good demand from consumers in the first half of month, but as market conditions relaxed buyers were inclined to wait for further developments.

QUICKSILVER

Trading in quicksilver was fairly active, although for the most part sales were for small quantities. Prices range from $123 to $125 per flask depending upon the quantity and the seller. Stocks abroad are said to be larger than a year ago, but reports indicate that they are in strong hands.

PLATINUM

Refined platinum continues to quote $76 per ounce. Demand is moderate and there are no developments to stimulate the market.

SILVER

Considerable irregularity developed in the silver market during the past month. There were several sharp reactions in price owing to falling off in demand from China and India. The month opened at 61¾ cents and at this writing quotes 60 cents an ounce. The outlook is uncertain at the moment, but is liable to change on short notice.

OLD METALS

There was a strong and active market for old copper and brass last month. Domestic and foreign buyers were eager purchasers and despite advancing prices supplies moved off readily. New brass clippings developed further strength. Export buying was specially good and offerings of high grade material was taken up freely at firm prices. Prices dealers are willing to pay were 12½c to 13¾c best quality crucible copper, 10¾c to 11½c for light copper, 7¼c for heavy brass, 10c to 10¼c for new brass clippings, 6c to 6¼c for light brass, 4¾c to 5c for heavy lead, 3¼c for old zinc, and 17¼c to 17½c for aluminum clippings.

Daily Metal Prices for the Month of June, 1928

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	4	5	6	7	8	11	12	13	14	15	18
Copper c/lb. Duty Free												
Lake (Delivered)	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875
Electrolytic (f. a. s. N. Y.)	14.80	14.80	14.80	14.80	14.80	14.80	14.80	14.85	14.85	14.85	14.85	14.85
Casting (f. o. b. N. Y.)	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15
Brass Special	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.25
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	49.75	49.55	49.375	49.50	49.75	49.00	49.125	48.625	48.25	48.625	48.625	47.50
Pig 99%	49.50	49.125	49.125	49.125	49.375	48.625	48.625	48.375	47.875	48.00	48.25	47.25
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.20	6.20	6.20	6.20	6.20	6.175	6.15	6.15	6.15	6.15	6.15	6.15
Aluminum c/lb. Duty 5c/lb.	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	37	37	37	37	37	37	37	37	37	37	37	37
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	10.625	10.50	10.50	10.375	10.25	10.25	9.875	10.00	9.875	9.875	9.50	9.625
Silver c/oz. Troy Duty Free	61.75	60.25	60.25	60.375	59.875	59.50	60.625	60.25	60.25	59.875	59.75	59.50
Platinum $/oz. Troy Duty Free	76	76	76	76	76	76	76	76	76	76	76	76

	19	20	21	22	25	26	27	28	29	High	Low	Aver.
Copper c/lb. Duty **Free**												
Lake (Delivered)	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875
Electrolytic (f. a. s. N. Y.)	14.85	14.85	14.85	14.80	14.80	14.75	14.80	14.80	14.80	14.85	14.75	14.817
Casting (f. o. b. N. Y.)	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.40	14.40	14.50	14.40	14.490
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	6.15	6.15	6.15	6.15	6.15	6.20	6.20	6.20	6.20	6.20	6.15	6.186
Brass Special	6.25	6.20	6.20	6.20	6.20	6.25	6.30	6.30	6.30	6.30	6.20	6.233
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	46.625	46.875	45.75	46.00	46.50	46.125	47.125	47.125	47.375	49.75	45.75	47.865
Pig 99%	46.375	46.625	45.50	45.50	46.125	45.625	46.50	46.50	46.75	49.50	45.50	47.555
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.20	6.15	6.161
Aluminum c/lb. Duty 5c/lb.	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	37	37	37	37	37	37	37	37	37	37	37	37
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	9.375	9.625	9.625	9.50	9.625	9.375	9.50	9.50	9.50	10.625	9.375	9.851
Silver c/oz. Troy Duty Free	59.50	59.50	59.75	59.75	60	60.125	60.125	59.875	59.75	61.75	59.50	60.059
Platinum $/oz. Troy Duty Free	76	76	76	76	76	76	76	76	76	76	76	76

Metal Prices, July 5, 1928

NEW METALS

Copper: Lake, 14.87½. **Electrolytic,** 14.75. Casting, 14.40.
Zinc: Prime Western, 6.20. **Brass Special,** 6.30.
Tin: Straits, 46.125. **Pig, 99%,** 45.50.
Lead: 6.15. **Aluminum,** 24.30. **Antimony,** 9.375.

Nickel: Ingot, 35. **Shot,** 36. **Elec.** 37. **Pellets,** 40.
Quicksilver: flask, 75 lbs., $122.50. **Bismuth,** $2.10.
Cadmium, 75. **Cobalt,** 97%, $2.60. **Silver,** oz., Troy, 59.125.
Gold: oz., Troy, $20.67. **Platinum,** oz., Troy, $76.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10 to11¼
Brass Ingots Red	12 to13½
Bronze Ingots	12½to16
Casting Aluminum Alloys	21 to24
Manganese Bronze Castings	24 to40
Manganese Bronze Ingots	12½to16½
Manganese Bronze Forging	32 to42
Manganese Copper, 30%	25 to35
Monel Metal Shot	28
Monel Metal Blocks	28
Parsons Manganese Bronze Ingots	16½to19¾
Phosphor Bronze	14 to16
Phosphor Copper, guaranteed 15%	18 to21
Phosphor Copper, guaranteed 10%	17 to20
Phosphor Tin, no guarantee	60 to70
Phosphor Tin, no guarantee	60 to70
Silicon Copper, 10%.....according to quantity	28 to32

OLD METALS

Buying Prices		Selling Prices
12¼to12¾	Heavy Cut Copper	13¾to14
12 to12½	Copper Wire	13 to13¼
10 to10½	Light Copper	11¾to12¼
10 to10¼	Heavy Machine Composition	11 to11½
7¾to 8	Heavy Brass	9¼to 9½
6½to 6¾	Light Brass	8 to 8¼
7¾to 8	No. 1 Yellow Brass Turnings	9¼to 9¾
9¼to 9½	No. 1 Composition Turnings	10¾to11
5½to 5¾	Heavy Lead	6¾to 7
3½to 3¾	Zinc Scrap	4¾to 5¼
8 to10	Scrap Aluminum Turnings	12½to14¼
13 to13½	Scrap Aluminum, cast alloyed	17¼to18½
19 to20	Scrap Aluminum, sheet (new)	22 to22½
35 to37	No. 1 Pewter	41½to43½
11½	Old Nickel Anodes	13½
17½	Old Nickel	19½

Wrought Metals and Alloys

COPPER SHEETS

Mill shipment (hot rolled)	23½c. to 24½c. net base
From Stock	24½c. to 25½c. net base

BARE COPPER WIRE

16⅛c. to 16⅝c., net base, in carload lots.

COPPER SEAMLESS TUBING

25c. to 26c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	22c. net base
100 lbs. to 200 lbs. in one order	22½c. net base

ZINC SHEET

Duty sheet, 15%	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	9.25 net base
Casks, jobbers' price	9.75 net base
Open casks, jobbers' price	10.25 to 10.50 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price, ton lots.....33.30c.
Aluminum coils, 24 ga., base price, ton lots.....31.00c.

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods	53c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 10½c. over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver 60¾c. to 62¾c. per ounce, Troy.

BRASS MATERIAL—MILL SHIPMENTS

In effect May 25, 1928
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb. High Brass	Low Brass	Bronze
Sheet	$0.19¼	$0.20¾	$0.22¾
Wire	.19¾	.21¼	.23¼
Rod	.17	.21½	.23½
Brazed tubing	.27¼	....	.32½
Open seam tubing	.27¼	....	.32½
Angles and channels	.30¼	....	.35½

For less than 5,000 lbs. add 1c. per lb. to above prices.

BRASS SEAMLESS TUBING

24½c. to 25⅛c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	21¼c. net base
Muntz or Yellow Metal Sheathing (14"x48")	19¼c. net base
Muntz or Yellow Rectangular sheet other Sheathing	20¼c. net base
Muntz or Yellow Metal Rod	17¼c. net base

Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	27 c.	10% Quality	30 c.
15% Quality	28½c.	15% Quality	33¾c.
18% Quailty	29¾c.	18% Quality	37 c.

MONEL METAL SHEET AND ROD

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over. Prices f. o. b. mill.

Supply Prices, July 5, 1928

ANODES

Copper: Cast	21¾c. per lb.	**Nickel:** 90-92%	45c. per lb.
Rolled, oval	21⅜c. per lb.	95-97%	47c. per lb.
Rolled, sheets, trimmed	22⅝c. per lb.	99%	49c. per lb.
Brass: Cast	22¾c. per lb.		
Zinc: Cast	12 c. per lb.		

Silver: Rolled silver anodes .999 fine are quoted from 62¾ to 64¾c., Troy ounce, depending upon quantity.

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	$31.00
14" 20 ply 64/68 Unbleached	39.95
12" 20 ply 80/92 Unbleached	33.05
14" 20 ply 80/92 Unbleached	44.80
12" 20 ply 84/92 Unbleached	42.50
14" 20 ply 84/92 Unbleached	57.60
12" 20 ply 80/84 Unbleached	38.35
14" 20 ply 80/84 Unbleached	52.00
Sewed Pieced Buffs, per lb., bleached	45-70c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.12-.17
Acid—Boric (Boracic) Crystals	lb.	.08½
Chromic, 75 and 125 lb. drums	lb.	.21-.22
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.17¾-.22¼
Denatured, drums	gal.	.45-.53
Alum—Lump, Barrels	lb.	.03¼
Powdered, Barrels	lb.	.039
Aluminum sulphate, commercial tech.	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—Sulphate, tech., bbls.	lb.	.03¾
Sulphocyanide	lb.	.65
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls.	lb.	.04½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.28
Chromic Sulphate	lb.	.37
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, bbls.	lb.	.16-.17
Cyanide (100 lb. kegs)	lb.	.50
Sulphate, bbls.	lb.	.06
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$70.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59-.61
Iron Sulphate (Copperas), bbl.	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13¼
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Nickel—Carbonate, dry, bbls.	lb.	.29
Chloride, bbls.	lb.	.18
Salts, single, 300 lb. bbls.	lb.	.10½
Salts, double, 425 lb. bbls.	lb.	.10
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash, Caustic Electrolytic 88-92% broken, drums	lb.	.09
Potassium Bichromate, casks (crystals)	lb.	.09
Carbonate, 96-98%	lb.	.06¾-.07
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.05½
Silver Chloride, dry, 100 oz. lots	oz.	.49½-.54¼
Cyanide (fluctuating)	oz.	.57-.66
Nitrate, 100 ounce lots	oz.	.42¾-.51½
Soda Ash, 58%, bbls.	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.19
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls.	lb.	.04¼
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.02
Sulpho Cyanide	lb.	.32½
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.37-.38
Tripoli, Powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc, Carbonate, bbls.	lb.	.11
Chloride, casks	lb.	.06¾
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03¾